

**QA:NA**

**RAIL ALIGNMENT FOR GEOLOGIC REPOSITORY AT  
YUCCA MOUNTAIN, NEVADA PROJECT**

**Final Draft  
WETLAND TECHNICAL MEMORANDUM:  
Functional Assessment, Impacts and Conceptual Mitigation**

**March 2008**

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## **ACRONYMS**

<b>ACOE</b>	United States Army Corps of Engineers
<b>AU</b>	Assessment Unit
<b>BMP</b>	Best Management Practice
<b>CWA</b>	Clean Water Act
<b>DEIS</b>	Draft Environmental Impact Statement
<b>DOE</b>	Department of Energy
<b>EIS</b>	Environmental Impact Statement
<b>EPA</b>	Environmental Protection Agency
<b>ESA</b>	Endangered Species Act
<b>FEIS</b>	Final Environmental Impact Statement
<b>FCI</b>	Functional Capacity Index
<b>GIS</b>	Geographic Information System
<b>MVW</b>	Meadow Valley Wash
<b>NEPA</b>	National Environmental Policy Act
<b>NWI</b>	National Wetlands Inventory
<b>ROW</b>	Right of Way
<b>RFT</b>	Riverine Flow Through
<b>TM</b>	Technical Memo
<b>USFWS</b>	United States Fish and Wildlife Service



## **EXECUTIVE SUMMARY**

The Department of Energy (DOE) is preparing a Draft Environmental Impact Statement (EIS) to analyze the potential environmental impacts associated with constructing and operating a railroad to a geologic repository at Yucca Mountain, Nevada (DOE 2007) (hereafter called the Rail Alignment EIS). Two implementing alternatives are being considered, Caliente and Mina. This technical memorandum (TM) summarizes existing and new information on existing wetlands and proposed impacts to wetlands occurring within these implementing alternatives. Specifically, the TM clarifies affected wetlands by railroad alternative and options, provides the results of a wetland functional assessment procedure (Adamus 2001; Adamus and Field 2001) applied to affected wetlands, describes direct and indirect impacts to wetlands (acres and functions), and describes conceptual mitigation opportunities by railroad alternative and options.

In addition to summarizing information on the wetland affected environment and proposed impacts, the primary purpose of this TM is to provide new data and analysis on existing wetland functions, and to take existing wetland functions into account in the analysis of impacts and mitigation opportunities.

### **Description of the Alternatives**

Summarizing from the Rail Alignment EIS (DOE 2007), the Proposed Action (with two implementing alternatives, each with a Shared-Use Option) and the No-Action Alternative are described. The two implementing alternatives are Caliente and Mina. The DOE's preferred alternative is to construct and operate a railroad along the Caliente rail alignment and to implement the Shared-Use Option.

To construct the rail roadbed for the Caliente alternative segment, about 6.9 acres of wetlands would be filled to construct the rail roadbed for the Caliente alignment segment. An additional 47 acres of wetlands would be filled to construct the Staging Yard and associated quarry siding at the Indian Cove location, or 1.5 acres of wetlands would be filled to construct a quarry siding if the Upland location of the Staging Yard were selected.

To construct the rail roadbed, other facilities and interchange yard for the Eccles alternative segment, no wetlands would be filled. However, up to 11 acres within the confines of Clover Creek would be filled to construct the interchange yard, and additional fill may be required to construct dikes to protect the siding from flood waters. That fill would extend along about 1.8 miles of the south bank Clover Creek. Indirect impacts as a result of fill within Clover Creek could potentially affect downstream wetlands and riparian areas.

Under the Mina Implementing Alternative, placement of piers for construction of a bridge over the Walker River would result in up to 300 square feet of direct wetland impact for emplacement of up to 14 piers.

## Methodology

An assessment of wetland functions was conducted using a hydrogeomorphic- (HGM) based wetland assessment procedure developed for the state of Oregon, *Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites* (Adamus 2001). Federal wetland regulatory agencies encourage use of HGM-based wetland assessment methods to document existing wetland functions and provide a basis for analysis of potential modifications in wetland functions as a result of a proposed action. Potentially impacted wetland functions can then be translated more effectively to sideboards and rationale in articulating wetland mitigation goals and objectives, which are often based more strongly on wetland area than wetland functioning.

Wetlands in the project area were characterized by HGM class (e.g., "Depressional") and grouped by HGM similarity into seven Assessment Units (AUs). Summaries of wetland function by AUs were developed to document existing wetland condition in terms of function capacity for up to twelve functions in each AU.

In addition to conducting the function assessment, the Quarry Siding location along the Caliente alternative segment was investigated during field work to determine presence and approximate boundary of additional potential wetland area.

Conceptual mitigation opportunities in the project vicinity were evaluated by both field investigation and off-site evaluation to promote consistency with regional plans, policies and regional land management attributes (e.g., grazing).

## AFFECTED ENVIRONMENT

The seven AUs include five AUs within the Caliente alternative segment (AU-1 through AU-5), one AU within the Eccles alternative segment (AU-6), and one AU within the Mina implementing alternative (AU-7). Table 2 provides a summary of wetland function assessment data by AU. The AUs are depicted on Figures 3 – 5. Function assessment scoring datasheets are included as Appendix A, and representative photographs of all AUs visited are provided as Appendix B.

Across the project area, function assessment scores ranged from 0.2 to 0.7 (on a scale of 0.0 – 1.0). Most individual functions within AUs tended to cluster at a "moderate" function capacity, scoring in the general range of 0.4 - 0.6. As shown in Table 2 and Appendix A, the seven AUs exhibit variability in relative level of wetland functioning both within and between AUs. Variability in scores is based directly on site attributes upon which subscores of functions are assigned (Appendix B). The likely rationale for the tendency toward moderate functional scores throughout the project area concerns existing land use and water management related factors that serve to limit higher existing function capacity. Examples include streambank incision, irrigation inputs and grazing effects on vegetation. Brief summaries of AU-1 through AU-7 are provided below.

- **Assessment Unit 1** is classified as Riverine Flow-through (RFT) under the HGM framework, and includes wetlands located within the incised portion of the Meadow Valley Wash. Wetland hydrology is directly associated with Meadow Valley Wash. Beaver are active in this area and have constructed three or more beaver dams within the AU. This has resulted in a complex of pools and glides that are highly dynamic. This unit is characterized by generally moderate functional capacity. Only two scores were at or below 0.3 ("low" function class").
- **Assessment Unit 2** is classified as Slope under the HGM framework, and includes gently sloping wetland pasture located throughout the Caliente Alternative Segment. Wetland hydrology is characterized by dominance of horizontal water movement toward the southern portion of the valley. Natural springs, irrigation diversions and Meadow Valley Wash provide hydrology sources for AU-2 wetland. Active grazing occurs on most if not all of AU-2 wetlands. This unit is characterized by generally moderate functional capacity. Only two scores were at or below 0.3.
- **Assessment Unit 3** is classified as RFT and includes all of the wetlands located within the active floodplain of Meadow Valley Wash. The majority of this AU along the alignment is isolated from cattle. These wetlands are generally inundated or saturated during high stream flows on an annual basis, and exhibit visibly flowing water during (at minimum) the wet season. Wetlands in AU-3 are often well-connected to the adjacent floodplain. Vegetation in this AU is fairly well-established and characterized by a diverse assemblage of native wetland forbs. As a RFT HGM classification AU, this unit is characterized by generally moderate functional capacity. Only one score was at or below 0.3.
- **Assessment Unit 4** includes several linear wetland fragments, classified as Slope under the HGM framework, that are generally located along the base of the abandoned railroad bed and U.S. Highway 93. Prior to original construction of the abandoned railroad bed and U.S. Highway 93, many of these wetlands were likely to have been contiguous with wetlands classified as AU-2. Unique to these narrow, linear wetland fragments, they are likely augmented by an additional surface sheet-flow component due to being linear, narrow and often having gently sloped upland boundaries. Wetlands in this AU appear generally degraded due to the fragmentation effects and encroachment by more non-native, ruderal species. This AU is characterized by a generally low functional capacity (many scores of 0.3) relative to the other AUs.
- **Assessment Unit 5** includes wetlands associated with deeper water, basin topography that classifies as Depressional under the HGM framework. The AU-5 wetlands are generally perennial in character, but occasionally dry out, thus they exhibit a semi-permanent hydrologic regime typified by 1.5 - 3 ft. water depth (during wet season). Cattle have little impact except around the edges, thus AU-5 wetlands typically support a less degraded vegetation community. Hardstem bulrush is dominant in these wetlands, and wetland pasture species occurs in drier areas. This AU is characterized by a strongly moderate functional capacity with function scores range between 0.5 –

0.7. It therefore exhibits the ability to perform a variety of functions at a moderately strong capacity.

- **Assessment Unit 6** is classified as RFT and includes wetlands within the active and highly dynamic Clover Creek floodplain within the Eccles alternative segment. Clover Creek is seasonal and has a widely meandering low-flow channel containing pockets of wetlands. Fill placement in association with recent maintenance activities on the existing Union Pacific (UP) rail line to the south of Clover Creek has constricted the floodplain compared to pre-project conditions. However, the floodplain constrictions have been reversed to comply with an enforcement action from the U.S. Environmental Protection Agency (EPA). The hydrogeomorphic character of AU-6 is dynamic within its setting in the active floodplain of Clover Creek. Function scores for habitat support range between 0.4 – 0.6. Function scores for physical processes (e.g., sediment stability) tend to be lower (in the 0.2 – 0.3 range) due to the dynamic regime characterizing wetlands within the creek's floodplain.
- **Assessment Unit 7** is located along the banks of the Walker River in the northwestern portion of the Mina Alternative, and is classified as RFT. Primary hydrological influence is associated with surface and groundwater associated with the Walker River. An off-site assessment was conducted for AU-7 due to the low potential direct wetland impacts (up to 300 square feet in total). Also, Mina alignment is not the preferred alignment alternative. Off-channel wetlands adjacent to the Walker River are connected to the channel-fringing wetlands, resulting in a more complex habitat and hydrologic setting due to two subtypes of wetland landform setting. This AU is characterized by moderate functional capacity with scores ranging between 0.3 – 0.6.

## ENVIRONMENTAL CONSEQUENCES

Direct, indirect, temporary and permanent impacts to wetlands are summarized on the basis of current project design. Both areal extent of direct impacts and predicted impairment of functional attributes from both direct and indirect impacts are evaluated, and summarized in Table 3 by alternative and options. For purposes of this analysis, relative severity impacts to existing wetland function is assumed to be proportionate to acreage of wetlands directly impacted.

Cumulative effects to wetland area and function would be considered small. The total amount of impacts (acres) and loss of function could be considered an incremental contribution to cumulative total of wetland loss in the area of influence as described in Chapter 6 (DOE 2007). If the DOE provides mitigation for these losses the residual effect could be short-term and would be minimized.

## CONCEPTUAL MITIGATION OPTIONS

Conceptual mitigation opportunities within the same watershed as potential direct impacts to wetlands would occur in are diverse. Opportunities for partnering with local land managers, including private landowners and the agencies (e.g., U.S. Bureau of Land Management [BLM]) appear feasible from a conceptual standpoint, such that compensatory wetland mitigation goals and objectives for the proposed project could align with existing practices and policies in the regional land setting.

The majority of permanent direct wetland impacts would occur to pasture wetlands in functional AU-2 and AU-4. Minor impacts would occur at stream crossings (AU-1, AU-3 and AU-5) if bridge piers cannot be designed outside of wetland riparian areas. Mitigation for impacts in the Caliente alternative segment is recommended to include vegetation and/or hydrological (i.e., augmentation) enhancement consisting of dense, thin-stemmed emergent vegetation (e.g., bulrush) in an area(s) that receives annual inundation from stream flow during high water events. Mitigation for potential indirect wetland impacts associated with the Eccles alternative segment is recommended to include support of multi-strata, characteristic vegetation with a focus on restoring forested wetland to provide shade, primary production of organic materials (including woody debris), and placement of large woody debris or rock to influence the creation of shaded pools for resident fish. This second goal would also foster the development of habitat for wetland-dependent avian species. Mitigation for potential small wetland impacts within the Mina implementing alternative could focus on riparian fringe and/or off-channel wetland enhancement such as noxious weed control.

Conceptual mitigation opportunities by alternative and options include:

### Caliente Alternative Segment

- *On-site, In-kind Mitigation -*
  - **Option #1: Cattle Exclusion on Railroad ROW** - Fence the railroad ROW in wetland areas to exclude cattle impacts.
  - **Option #2: Cattle Exclusion Elsewhere** - Coordinate with local grazing managers/landowners on the possibility of a landscape-level cattle exclusion area.
- *On-site, Out-of-kind Mitigation* - Amend in-kind mitigation elsewhere on-site with riparian plantings along the Meadow Valley Wash, particularly within the DOE's ROW.
- *Off-site, Out-of-kind Mitigation* - Mitigate at a watershed scale by a partnership with the BLM (or other agency/entity) to enhance riparian wetland habitat in the Rainbow Valley reach of Meadow Valley Wash. Habitat for special-status species including southwestern willow flycatcher could be targeted.

### Eccles Alternative Segment

- *On-site, In-kind Mitigation* – Conduct enhancement within the Clover Creek floodplain by erosion control, enhancement plantings and other activities. Because of the potential indirect impacts to wetlands located downstream of the proposed Eccles staging yard impacts, wetland enhancement activities located downstream of the project area may be considered on-site.
- *On-site, Out-of-kind Mitigation* – Conduct wetland enhancement in Wetland WT-7, an area surrounded by railroad embankments.
- *Off-site mitigation, In-kind Mitigation* - Off-site mitigation opportunities described for the Caliente Rail Segment would also provide mitigation for the Eccles Rail Segment. However, for the Eccles segment, the Rainbow Valley Meadow Valley Wash enhancement activities would be considered in-kind.

### Mina Implementing Alternative

*On-site, In-kind Mitigation* – Conduct wetland and riparian enhancement such as bank stabilization, tree and shrub plantings and habitat structures.

## **1. INTRODUCTION**

The Department of Energy (DOE) is preparing a Draft Environmental Impact Statement (EIS) to analyze the potential environmental impacts associated with constructing and operating a railroad to a geologic repository at Yucca Mountain, Nevada (DOE 2007) (hereafter called the Rail Alignment EIS) (Figure 1). Two implementing alternatives are being considered, Caliente and Mina. This technical memorandum (TM) summarizes key information and presents new data and analyses on wetlands occurring within the Caliente and Mina implementing alternatives. This report also summarizes potential project-related direct, indirect and cumulative impacts to wetlands, and describes conceptual compensatory mitigation opportunities.

The purpose of this TM is to:

- More clearly disclose affected wetlands by railroad alternatives and options;
- More clearly describe the direct and indirect impacts to wetlands by railroad alternatives and options;
- Provide a function assessment of wetlands within railroad alternatives and options, using a rapid-based process that is acceptable to the Army Corp of Engineers (ACOE);
- Describe conceptual mitigation options for railroad construction and operational impacts to wetlands; and
- Support the response-to-comments process and preparation of the Rail Alignment Final EIS (FEIS).

## **2. DESCRIPTION OF THE ALTERNATIVES**

The Rail Alignment EIS (DOE 2007) analyzes a Proposed Action (with two implementing alternatives, each with a Shared-Use Option) and the No-Action Alternative. Chapter 2 of the Rail Alignment EIS contains a detailed description of the two implementing alternatives (Caliente and Mina), which will be summarized briefly below. The DOE preferred alternative is to construct and operate a railroad along the Caliente rail alignment and to implement the Shared-Use Option.

Under the Proposed Action, DOE would determine an alignment (within a corridor) and construct and operate a rail line and associated facilities and infrastructure in Nevada to transport spent nuclear fuel, high-level radioactive waste, and other materials to a repository at Yucca Mountain. DOE would also use the rail line to transport materials needed for construction, operation, and maintenance of the repository and rail line. The Proposed Action includes the construction of rail-line operations support facilities, including the Yucca Mountain Railroad Staging Yard, the Interchange Yard, Maintenance-of-Way Facilities, the End-of-Line Facility, the Cask Maintenance Facility, and the Yucca Mountain Railroad Control Center and National Transportation Operations Center.

## **2.1 CALIENTE IMPLEMENTING ALTERNATIVE**

Under the Caliente Implementing Alternative, the DOE would construct, operate, and possibly abandon a rail line within the Caliente rail corridor for the shipment of spent nuclear fuel, high-level radioactive waste, and other materials within Nevada. The proposed rail line would run from a site in or near the City of Caliente, Lincoln County, Nevada, to a geologic repository at Yucca Mountain, Nye County, Nevada (Figure 1). Section 2.2.1 of the Rail Alignment EIS (DOE 2007) describes the Caliente Implementing Alternative. Figure

The Caliente rail alignment is comprised of six common segments and fifteen alternative segments. Alternative segments are portions of the rail alignments for which DOE is considering two or more reasonable alternative routes for the rail line. For the areas where alternative segments have been developed, DOE has selected a preferred segment. DOE identified preferred alternative segments within the Caliente rail alignment based on analysis of environmental impacts, engineering and cost factors, and regulatory compliance issues, including permit requirements and challenges, stakeholder preference, land-use conflicts, and uncertainties. All six of the common segments along the Caliente rail alignment are part of the DOE preferred alternative.

DOE considered both the Caliente and Eccles alternative segment to connect the proposed railroad to the existing Union Pacific Railroad Mainline in or near the City of Caliente (DOE 2007, Figure 2-5), and selected the Caliente alternative segment as the preferred segment. For the Caliente Rail Alignment, wetlands are chiefly found along the Caliente alternative segment; therefore, that is the focus of this technical memo.

### **2.1.1 Caliente Alternative Segment**

The Caliente alternative segment would be constructed primarily on the abandoned roadbed of the Union Pacific Railroad Pioche and Prince Branchline. It would begin in Caliente, enter Meadow Valley at Indian Cove, and extend generally north through Meadow Valley and adjacent to U.S. Highway 93 (DOE 2007, Figure 2-5). This alternative segment would then cross U.S. Highway 93 about 3 miles southwest of Panaca and connect to Caliente common segment 1 about 0.6 mile northwest of U.S. Highway 93 and 11 miles south of Pioche. The Caliente alternative segment would be approximately 7 miles long (Nevada Rail Partners 2007, p. E-4).

If DOE were to select the Caliente alternative segment, an Interchange Yard, Staging Yard, and a ballast quarry would be constructed along or near the alignment. The Interchange Yard would be constructed in the City of Caliente across from the former Union Pacific Railroad Caliente Station. The Staging Yard would be either at the Indian Cove site less than 1 mile north of the interchange with the Union Pacific Railroad mainline or at the Upland site about 6 miles north of that interchange. A ballast quarry (CA-8B) would be developed about 4 miles northwest of Caliente. If the Indian Cove Staging Yard were to be constructed, a conveyor belt would be installed from the quarry to the yard, and a ballast stock pile, loading facility, and siding would be co-located with



the Staging Yard. If the Upland Staging Yard were to be constructed, the conveyor belt would run to a 23-acre siding and associated facilities immediately south of Beaver Dam Road and to the east of the mainline track.

The planned construction right-of-way is 100 feet wide along most of the Caliente alternative segment. The right-of-way is narrower along this segment than along most of the remainder of the alignment to minimize impacts to private property and surface waters. There are 23.3 acres of wetlands within this construction right-of-way.

The Caliente alternative segment would cross streams classified as Waters of the United States at five locations (DOE 2007, Section 4.2.5.2.2.1), including three crossings of the perennial Meadow Valley Wash (MVW) and one crossing each of the intermittent or ephemeral Clover Creek Wash and Bennett Springs Wash. There currently are old bridges at each of these wash crossings that would be replaced with steel or precast concrete bridges. These new bridges will span the flow channels and any adjacent wetlands.

A total of about 2.6 acres of wetlands within the construction right-of-way occur at two locations where the abandoned Union Pacific Railroad roadbed is immediately adjacent to Meadow Valley Wash (wetlands WT-6/WT-5, and WT-1/PWT-1) and one location where it is adjacent to Bennett Springs Wash (wetlands PWT-2/WT-4). Please refer to PBS&J (2006) for figures depicting all wetlands referred to by name in this TM. In those areas, the washes are incised 10 to 40 feet below the old roadbed and have narrow bands of palustrine emergent or palustrine scrub-shrub wetlands adjacent to the stream channels (PBS&J 2006, all). At two of these locations, the alignment would also cross the washes. All of these wetlands would be avoided by shifting the location of the roadbed away from the edge of the washes and constructing bridges over the wetlands at crossings.

All of the remaining wetlands within the construction right-of-way of the Caliente alternative segment are along the first five miles of the alignment segment in Indian Cove and southern Midway Valley (DOE 2007, Figures F-5 and F-6). These palustrine emergent wetlands are adjacent to Meadow Valley Wash or supported by subsurface flow or springs that drain into Meadow Valley Wash (PBS&J 2006, all). To minimize impacts to wetlands in the Indian Cove area and southern Meadow Valley, the Caliente alternative segment would be constructed over the abandoned Union Pacific Railroad roadbed. That roadbed is an upland feature that generally is about 3 feet above the surrounding terrain and 25 to 45 feet wide (PBS&J 2006, p. 13 and Figure 4). In addition, where the alignment crosses wetlands, the new rail roadbed would be constructed with a 2:1 slope and without a permanent access road. That roadbed would have a maximum width of about 55 feet. Constructing this narrow roadbed would reduce the amount of wetlands permanently filled from a total of about 20.7 acres within the construction right-of-way in this area to 0.028 square kilometers 6.9 acres. Those wetlands are all along a continuous 4.0-mile-long section of the alignment starting at the south end of the pasture south of Indian Cove and ending about 0.6 miles south of Beaver Dam Road (DOE 2007, Figure F-5).

#### 2.1.1.1 Interchange Yard

The interchange yard for the Caliente alternative alignment segment would be in the City of Caliente across from the former Union Pacific Railroad Caliente station (DOE 2007, Figure 2-44). That facility would include a wye track that would allow access to the alignment from both the east and west. There are no wetlands or other surface water features in this area.

#### 2.1.1.2 Staging Yard

DOE is considering two optional locations for the Staging Yard along the Caliente alternative segment (Indian Cove and Upland). The Indian Cove Staging Yard would be constructed in a pasture that is within the limits of the City of Caliente. Portions of the pasture are covered with palustrine emergent wetlands that are frequently grazed by cattle. Those wetlands are supported by water diverted from Meadow Valley Wash to irrigate the pasture and possibly from groundwater flow from north of the pasture (PBS&J 2006, all). Construction of the Staging Yard in this area would require the wetlands to be filled above the level of the floodplain. It might also require an active drainage system and a channel around the eastern edge of the site to keep the area dry and in a stable condition. Construction of the Staging Yard in Indian Cove would require filling up to 47 acres of wetlands.

The Upland site of the Staging Yard is within and adjacent to an agricultural field in Meadow Valley. One or more sets of tracks at the north end of this yard would cross Bennett Springs Wash, a water of the United States. A bridge would be constructed at that crossing and no fill would be placed in the wash. There is an isolated wetland immediately to the west of the Upland site, in a swale adjacent to the abandoned rail roadbed. That wetland is confined to the lower part of the swale where water ponds and it has no apparent surface connection to Meadow Valley Wash or its tributaries (PBS&J 2006, Table 6). Nonetheless, DOE will avoid filling this wetland by constructing the staging yard to the west of the abandoned rail roadbed. Therefore, no fill of wetlands or other waters of the United States will be required to construct the Staging Yard at the Upland site.

#### 2.1.1.3 Quarry Siding

If the Staging Yard would be constructed in Indian Cove, ballast mined from quarry Ca-8B west of the alignment segment would be transported to that Staging Yard by conveyor belt and loaded onto ballast cars in that yard. No additional fill of wetlands or other waters of the United States would be required for that siding or support facilities.

If the Upland site of the staging yard would be selected, a siding would have to be constructed immediately south of Beaver Dam Road and to the east of the mainline track. The siding would be 5,000 feet long and 200 feet wide. Ballast may be transported from the quarry to the siding on a conveyor belt. The route of the conveyor belt was selected to avoid dwellings to the maximum extent possible and maintain an optimum grade.

Ballast could be stored at multiple locations along the siding so that loading would occur along the entire length of a stationary train. Loading of ballast could also occur at a single point if small (i.e., approximately 1,500 feet long) sections of a ballast train were loaded at one time while the remainder of the ballast train was temporarily stored at the Upland Staging Yard.

Wetlands in the western 100 feet of this proposed location (i.e., within 100 feet of the alignment centerline) were delineated as described in Waters of the U.S. Jurisdictional Determination Report for Yucca Mountain Project - Caliente Rail Corridor (PBS&J 2006, all). A total of 1.24 acres of wetlands were delineated in that area. On January 31 and February 12, 2008, staff from Bechtel SAIC Company, LLC; Potomac-Hudson Engineering; and URS Corporation visited the proposed siding location and mapped potential wetlands in the eastern half of the site. A total of 0.35 acres of wetlands were mapped; thus, the total area of wetlands within the site is estimated to be 1.59 acres. Note that the mapping of wetlands conducted in 2008 should not be considered a formal delineation of wetlands conducted in accordance with methods approved by the ACOE.

#### 2.1.1.4 Summary

In summary, about 6.9 acres of wetlands would be filled to construct the rail roadbed for the Caliente alignment segment. An additional 47 acres of wetlands would be filled to construct the Staging Yard and associated quarry siding at the Indian Cove location, or 1.5 acres of wetlands would be filled to construct a quarry siding if the Upland location of the Staging Yard were selected.

#### **2.1.2 Eccles Alternative Segment**

The Eccles alternative segment would begin along Clover Creek about 5 miles east of Caliente and trend generally north to enter Meadow Valley from the southeast (Figure 1 and DOE 2007, Figure 2-5). This alternative segment would then cross U.S. Highway 93 about 3 miles southwest of Panaca and connect to Caliente common segment 1 about 0.6 mile northwest of U.S. Highway 93 and 11 miles south of Pioche. The Eccles alternative segment would be about 12 miles long (Nevada Rail Partners 2007, p. E-4).

If the DOE were to select the Eccles alternative segment, an Interchange Yard and Staging Yard would be constructed along the alignment. There are no suitable ballast quarry locations along the Eccles alternative segment and the Department would have to obtain ballast from an existing commercial quarry if this alternative segment were selected.

##### 2.1.2.1 Interchange Yard

The Interchange Yard at Eccles would be approximately 5 miles east of the City of Caliente. It would be constructed immediately north of the Union Pacific Railroad Mainline within the confines of Clover Creek (DOE 2007, Figure 2-43). Portions of the south bank of Clover Creek would be filled to a height of 6 feet or more to elevate the

site out of the floodplain to the height of the existing tracks. For construction of the interchange tracks, the fill would extend approximately 50 to 75 feet into the creek for a length of approximately 4,600 feet along the creek. For construction of the interchange siding, the fill would extend approximately 25 feet into the ephemeral creek bed for a length of approximately 3,000 feet on the east end and 2,000 feet on the west end of the interchange tracks.

The total area to be filled in Clover Creek for construction of the siding would be approximately 8.2 to 11 acres, depending on the width of the fill. The volume of fill placed in the jurisdictional channel of Clover Creek would be approximately 13,000 to 17,000 cubic yards, and the total volume of fill required to extend and raise the south bank of Clover Creek 6 feet or more to the height of the existing track would be about 85,000 to 110,000 cubic yards.

There are five small wetlands along the section of Clover Creek where the Interchange Yard would be constructed. None of these wetlands would be permanently filled to construct the yard. However, three of these wetlands are in Clover Creek and could be indirectly impacted if the flow of Clover Creek is redirected or otherwise affected by filling and stabilizing the south bank of that stream.

#### 2.1.2.2 Staging Yard

The Staging Yard for the Eccles alternative segment would be located in Meadow Valley about 3,000 feet east of U.S. Highway 93 (DOE 2007, Figure 2-47). One ephemeral water of the United States would be crossed by this Staging Yard and three ephemeral waters would be crossed by the access road to the site. A total of 0.14 acres of waters of the United States would be filled to construct this yard. There is no alternative location for this yard along the Eccles segment in Meadow Valley that would not cross at least one water of the United States.

#### 2.1.2.3 Summary

In summary, a total of approximately 0.21 acres of fill would be required to construct crossings of the rail roadbed at 11 jurisdictional waters along the Eccles alternative segment. No wetlands would be filled to construct the rail roadbed or any facilities. Up to 11 acres of Clover Creek would be filled to construct the interchange yard and additional fill may be required to construct dikes to protect the siding from flood waters. That fill would extend along about 1.8 miles of the south bank Clover Creek. An additional 0.14 acres of waters of the United States would be filled to construct the Staging Yard.

## **2.2 MINA IMPLEMENTING ALTERNATIVE**

Under the Proposed Action Mina Implementing Alternative, DOE would determine a rail alignment within the Mina rail corridor and would construct, operate, and possibly abandon a rail line for the shipment of spent nuclear fuel, high-level radioactive waste,

and other materials within Nevada. The rail line would run from Hazen, Churchill County, Nevada, to a geologic repository at Yucca Mountain, Nye County, Nevada (DOE 2007, Figure 2-12). Section 2.2.1 of the Rail Alignment EIS (DOE 2007) describes the Mina Implementing Alternative.

Under the Mina Implementing Alternative, potential wetland impacts would be confined to the Schurtz alternative segments (DOE 2007, Figure 2-13). A survey for wetlands along the Mina rail alignment conducted by DOE in support of the Rail Alignment EIS (DOE 2007) identified emergent wetlands (WRN-1, WRN-2, WRN-3, and WRN-4) associated with the Walker River that would be crossed (bridged) by the Schurz alternative segments (DOE 2007, Figure F-17). The total surface area for these wetlands is 16 acres (DOE 2007, p. F-28).

If DOE were to select the Mina Implementing Alternative, placement of piers and construction of a bridge over the Walker River would result in permanent and temporary (construction-related) wetland impacts. Placement of piers and construction of the bridge in the active stream would occur during low flow (generally September through April). To provide access for cranes and other heavy equipment to the stream channel, which is about 40 feet wide in this area, heavy mats made of wood or other solid material would be sunk into the stream. There would be sufficient gaps between the mats to allow flow of water. No sand, gravel, or other loose fill will be placed in the stream channel. The mats would be removed from the channel after the bridge pilings are driven into ground and the concrete bridge sections are erected over the channel.

The double-cell bridge would be about 1,000 feet long with 40-foot pier spacing. The only permanent fill will be the concrete pilings required to support the bridge piers. Using these methods, the only permanent fill or loss of wetlands would be a total of about 0.005 acre for emplacement of about 10 piers in wetlands for Schurz alternative segments 1 and 4, or 0.007 acre for emplacement of about 14 piers for Schurz alternative segments 5 and 6.

DOE would minimize impacts by constructing a bridge over the Walker River and its associated wetlands. Of the 16 acres crossed in this area, only 300 square feet would be permanently filled to facilitate the construction of the bridge. By maximizing avoidance in this way, DOE would minimize permanent impacts to the maximum extent practicable.

### **3. METHODOLOGY**

Increasingly, federal regulatory agencies encourage the use of hydrogeomorphic- (HGM) based wetland assessment procedures, and these procedures have been widely adopted and regionalized across the nation. Nevada lacks a specific regionally-based HGM assessment procedure. A HGM-based assessment method, *Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites* (Adamus, 2001); hereafter "Oregon HGM Method" was selected for use in this project. The Oregon HGM Method includes treatment of the Basin and Range landform contained in the southeastern portion of the state. The project area occurs within the southern Basin and Range landform. On

the basis of this, and the Method's concise treatment of several common wetland functions, it was deemed suitable for application to this project.

Application of a standard assessment procedure to wetlands within the project study area serves several purposes. Primary among these is to provide an objective framework for assessment of proposed impacts to wetlands that not only considers area-based impact (acreage), but potential alteration to wetland site functional capacity by direct and/or indirect mechanisms. An impact assessment that takes functional capacity into consideration can also be used to determine the relative priority of functions to replace in a project's compensatory mitigation proposal.

Within this report, wetlands are identified and described consistently with the boundary determinations and identifiers contained in the Jurisdictional Determination Reports for Caliente (PBS&J 2006, all) and Mina alternative alignments (PBS&J 2007, all). For purposes of applying the functional assessment technique, landscape and landform elements were considered (e.g., does the wetland appear to continue beyond the study area boundary?); however this report relies primarily on existing wetland mapping and data characterization as contained in existing project documentation.

### **3.1 BACKGROUND RESEARCH**

#### **3.1.1 Document Review**

Existing documentation reviewed for purposes of this report includes:

- Rail Alignment Draft EIS (DOE 2007; Chapter 2, Chapter 3, and Appendix F);
- Waters of the U.S. Jurisdictional Determination for Yucca Mountain Project: Caliente Rail Corridor (PBS&J 2006);
- Waters of the U.S. Jurisdictional Determination for Yucca Mountain Project: Mina Rail Corridor (PBS&J 2007);
- Final EIS, Proposed Ely Resource Management Plan (Bureau of Land Management [BLM], 2007); and
- Geographic information system- (GIS) based mapping for the Caliente and Mina alternative alignments.

### **3.2 WETLAND FUNCTIONAL ASSESSMENT**

#### **3.2.1 Selection of Functional Assessment Methodology**

Preference for selection of an appropriate wetland functional assessment method for application to the project was driven by applicability to the CWA Section 404 Regulatory Program. The HGM assessment approach was initiated at the national level in the mid-1990's (Brinson 1993; Smith et al. 1995) and since that time the development of regional HGM guidebooks has increased. Models of wetland function that quantify "Functional Capacity Indices" (FCIs) are central to the HGM approach. The FCIs represent the

capacity of a wetland to perform a certain function. Differentiating features of the HGM approach include the following:

- Wetlands are classified according to three key factors influencing how wetlands function: landscape position (geomorphic setting), water source (hydrology) and water regime (hydrodynamics);
- A range of wetland functioning is established via reference sites; and
- Indices of assessed wetland function are relative and calibrated to reference wetlands.

### **3.2.2 Functional Assessment Method Application**

Wetland functions are generally assessed to document functional losses that would occur due to a proposed impact. By assessing wetland functions, mitigation can be designed to provide wetland functions in a manner and capacity that offsets proposed losses. Wetlands considered potentially likely to be either directly or indirectly impacted by the proposed project were evaluated using the Oregon HGM Method (Adamus 2001). Potential wetland impacts are consistent with those described in the DEIS, with the sole minor addition of added wetland acreage preliminarily determined in the Quarry Siding option in the Caliente rail alignment (as described in Section 2.1.1.3).

URS conducted the assessment of wetland functions using data gathered in the field during a field investigation on February 12-13, 2008. Wetlands within the study area were classified using the Oregon HGM Method (Adamus 2001). Wetlands were grouped into seven wetland assessment units (AUs). AUs consist of one or more wetlands grouped together based on proximity, common geomorphic setting, dominant hydrogeomorphic (HGM) classification, similar vegetation, soils, and/or water source. The Caliente alternative segment consists of five AUs, Eccles alternative segment one AU, and Mina implementing alternative one AU.

#### **3.2.2.1 HGM Classification Assessment Units**

Brinson's (1993) classification system remains the primary framework for HGM assessment techniques. There are seven wetland HGM classes recognized nationally (Smith et al. 1995), of which the following three classes are relevant to the proposed project. Brief descriptions of these three classes are also provided (Adamus 2001):

- *Riverine* – Dominant water source channel flow and bank overflow; dominant water direction is unidirectional for channels, and bidirectional for floodplains. Water flows visibly in most of site during most of wet season.
- *Depressional* – Fed primarily by overland flows; dominant water direction is vertical (seepage). Located in topographic depressions.
- *Slope* – Dominant water source is groundwater input; dominant water direction is unidirectional and horizontal. Slope wetlands may not have an apparent gradient and can appear quite flat. Lateral seepage from irrigation diversions can contribute hydrologically to Slope wetlands.

Fourteen subclasses within HGM classes are further defined in the Oregon HGM Method, of which for purposes of this TM the relevant subclass to describe is Riverine (class) "*Flow-through*" (subclass) (RFT, inclusively). Riverine Flow-through wetlands are typically within floodplains with minimal seasonal ponding, whether fringing a channel or comprising islands within a channel. Wetland ditches provide another example. The contrasting subclass to RFT wetlands is "Riverine Impounding" (RI). The RI subclass consists of primarily off-channel settings such as sloughs and temporarily ponded areas within two-year floodplains (Adamus 2001).

The "Judgmental Method" from *Guidebook for HGM-based Assessment of Oregon Wetland and Riparian Sites, Volume 1A: Assessment Methods* (Adamus and Field 2001) was used to evaluate wetland functions in the study area. A wetland "function" is typically defined as the hydraulic, geochemical, and biological processes that a wetland within a specific HGM class performs. The Oregon HGM Method is designed for ease of use and repeatability of results. The Method may be used to evaluate the following 13 wetland functions (described in further detail below):

- Water Storage and Delay
- Sediment Stabilization and Phosphorus Retention
- Nitrogen Removal
- Primary Production
- Thermoregulation
- Resident Fish Habitat Support
- Anadromous Fish Habitat Support
- Invertebrate Habitat Support
- Amphibian and Turtle Habitat
- Breeding Waterbird Support
- Wintering and Migratory Waterbird Support
- Songbird Habitat Support
- Support of Characteristic Vegetation

The "Judgmental Method" consists of a set of questions relating to the capacity of each wetland to perform a function. A score is assigned to each question pertaining to a given function. Scores are based on a scale of 0.0 to 1.0 with the score of "0.0" indicating minimal capacity and "1.0" indicating highest capacity. The function scores are often referred to as being "low," "moderate," or "high." For this report, function scores between 0.1 and 0.3 are considered "low," scores between 0.4 and 0.6 are "moderate," and 0.7 to 1.0 are "high."

Prior to field work, off-site methods for the functional assessment included reviewing the above background documentation, mapping and aerial photography showing the project areas. The majority of wetlands within the Caliente and Eccles alternative segments, as previously documented within the project area (PBS&J 2006; PBS&J 2007), were field-investigated to conduct the functional assessment. This report clearly documents (see Section 4) field vs. remotely investigated wetland areas. Wetlands in all project areas



(Caliente, Eccles and Mina) that were not revisited in the field are characterized by having no or very small proposed impacts. Existing documentation (PBS&J 2006; PBS&J 2007), inclusive of photographs, was utilized for such areas. Field work for this report was conducted along the Caliente and Eccles alternative segments. Information for the Mina implementing alternative is based on off-site data.

On February 12-13, 2008, two URS wetlands biologists accompanied project personnel familiar with the Caliente and Eccles alternative segment alignments to visit the majority of wetlands previously delineated in these areas (PBS&J 2006, PBS&J 2007). Maps depicting wetlands within the proposed construction right of way (ROW) were used for reference and data gathering. Notes and photographs were recorded on wetland characteristics including vegetation, hydrology and land management (e.g., grazing).

### 3.2.2.2 Wetland Functions Evaluated by the Oregon HGM Method

Brief characterization profiles of functions evaluated by the Oregon HGM Method, and examples of variables associated with predicting functional capacity are provided below.

#### *Water Storage and Delay*

Wetlands act as natural sponges, absorbing water during periods of high rainfall and releasing water when precipitation is scarce. For this reason, wetlands can mitigate the effects of flood or drought. Wetlands that provide high water storage and delay functions have soils that are able to absorb and hold water during periods of significant precipitation. Wetlands with the capacity for water storage and delay are typically large compared to the contributing watershed and generally have a depressional geomorphic setting, which allows water to be detained. Slope wetlands typically have low capacity for water storage.

#### *Sediment Stabilization and Phosphorus Retention*

Densely vegetated wetlands can often support the stabilization of sediments, ion exchange, and algal and bacterial decomposition of naturally occurring phosphorous or phosphorous pollutants where these inputs are available. Wetlands with the capacity to store and/or delay water and with the presence of well-developed vegetative root masses or woody debris able to trap newly deposited sediments tend to rate higher for this function. Sediment deposition can provide bank stabilization and slow water velocity.

#### *Nitrogen Removal*

Wetlands have the capacity to purify water by removing organic and mineral particulate matter through physical, biological and chemical processes. Nitrogen removal is an important function in areas exporting high amounts of nitrogen, such as agricultural areas. Wetlands with undisturbed, anaerobic soils and the ability to store and delay water have a higher capacity to remove nitrogen.

#### *Primary Production*

The production of organic matter occurs where vascular plants and algae produce carbon through photosynthesis, animals consume the carbon, and microbes decompose the carbon. Wetlands and riparian systems produce large amounts of organic material that

provides a foundation for development of food webs. A well-developed vegetation community and seasonally ponded areas are typical of wetlands with capacity for this function.

#### *Thermoregulation*

Some riverine wetlands have the capacity to maintain or reduce water temperature by providing shade and/or serving as a conduit and temporary holding area for discharging groundwater. Wetlands with deep, permanent water and a well-developed vegetation community including shrub and tree strata have a higher capacity for thermoregulation. Importance of this function increases when elevated temperature is known to be a limiting factor for one or more aquatic species in downstream waters.

#### *Fish Habitat Support – Resident and Anadromous*

Wetlands that provide the function of fish habitat support are assessed in appropriate cases. The resident fish habitat support function is assessed only if part of the site is permanently inundated and the subclass is riverine impounding. The anadromous fish habitat support function is assessed only if part of the site is accessible to anadromous fish during seasonal inundation. The capacity to support resident fish habitat is supported by wetlands along stream margins and backwater areas, especially the riverine impounding HGM subclass. Sites with better thermoregulation ratings should provide better fish habitat. Greater summer water depth and/or longer duration of flooded connection to permanent surface water also increase the capacity of this function.

#### *Invertebrate Habitat Support*

Wetlands that provide the function of invertebrate habitat support typically contain areas of seasonal or permanent inundation, undisturbed soils, and well-developed, undisturbed vegetation communities. Wetlands isolated in the landscape tend to have lower capacity for this function.

#### *Amphibian and Turtle Habitat*

Wetlands that function high for amphibian and turtle habitat have ponded water, an abundance of food, shelter (either vegetation or woody debris) from predators, basking and calling sites, and undisturbed adjacent upland habitat. The capacity of wetlands to support this function is negatively correlated with contaminated water and lack of other wetlands in proximity.

#### *Breeding Waterbird Support / Wintering and Migratory Waterbird Support*

Wetlands that provide the function of waterbird support have extensive ponded water, dense vegetation that can act as shelter from predators and extreme environmental conditions, lack of human disturbance, and are located in proximity to other wetlands. Slope headwater wetlands and wetlands that are small in size tend to have lower capacity for these functions.

#### *Songbird Habitat Support*

Wetlands with the capacity to support songbirds typically contain breeding, roosting, feeding, and refuge areas. They typically contain a well-developed vegetative

community, with a woody overstory. They are situated in undeveloped (natural) settings, are well connected to upland areas, contain some year-round surface water, and are undisturbed by humans. Capacity for this function is negatively correlated with small size, disturbance by humans, and lack of vegetative structure and surface water.

#### *Support of Characteristic Vegetation*

Plant communities influence local species diversity and contribute to regional biodiversity. Wetlands that function high for support of characteristic vegetation typically contain a diversity of native plant species and plant forms, large older trees, varied microtopography, moderate fluctuation in surface water, lack of human disturbance, and an undeveloped (natural) contributing watershed. Capacity for this function is negatively correlated with a dominance of non-native, invasive vegetative species on-site, developed surroundings, and frequent site disturbance.

### **3.3 ADDITIONAL WETLAND MAPPING**

Wetlands in the western 100 feet of this proposed location (i.e., within 100 feet of the alignment centerline) were documented as described in *Waters of the U.S. Jurisdictional Determination Report for Yucca Mountain Project - Caliente Rail Corridor* (PBS&J 2006, all). A total of 1.24 acres of wetlands were previously determined in to occur in that area. As a result of the wetland area assessment in the proposed siding location, a total of 0.35 acre of *additional* potential wetlands in the eastern half of the site were mapped. Thus, the total area of wetlands within the Quarry Siding location is estimated to be 1.59 acres. The added wetland area was not assessed by formal 1987 Manual methods, however the added areas are contiguous (extensions) of wetlands previously evaluated using the 1987 Manual.

URS biologists evaluated additional wetland areas for informal mapping (i.e., not at delineation level) within the Quarry Siding in the Caliente alignment (see Section 2.1.1.3) during the February 12-13, 2008 field investigation. This area had been previously investigated by staff from Bechtel SAIC Company LLC (BSC). URS' role was to provide additional evaluation of the wetland boundary determined by BSC. The proposed location of the quarry siding is immediately south of Beaver Dam Road and to the east of the mainline track. The siding would be 5,000 feet long and 200 feet wide.

### **3.4 WETLAND MITIGATION OPPORTUNITY ASSESSMENT**

During the field investigation, conceptual mitigation opportunities in the project vicinity were evaluated. Opportunities to promote consistency with regional plans and policies were also discussed with staff from BSC and Potomac-Hudson Engineering during the field investigation and follow-up meeting. Areas identified as relatively high quality wetland areas were documented as potential reference communities. These areas were determined to provide a good reference for target plant communities and topography.

## **4. AFFECTED ENVIRONMENT**

This section describes the affected environment of wetland resources within the Caliente and Mina alignments, focusing on results of the functional assessment process.

A summary of existing wetlands within the study area, including preliminary jurisdictional evaluation and function assessment status, is provided in Table 1. Table 2 provides a summary of wetland function assessment data by AU. Appendix A contains "Judgmental Method" function assessment data sheets for each AU. Appendix B provides representative photographs of AUs if available from on-site assessment. Figures 3 – 5 depict the AUs. All figures can be found at the end of this report.

### **4.1 WETLANDS FUNCTIONAL ASSESSMENT**

#### **4.1.1 Overview of Basin and Range Region**

In the Basin and Range physiographic province, Lacustrine Fringe (wetlands along the edge of lakes) and Depressional (described in Section 3) HGM classes predominate. High variability in water levels is associated with the region, on a range of time scales with flow events often occurring interannually and varying by decade. Many wetland areas originated where fault lines cross ancient lake sediments, but some were formed by lava flows blocking ancient groundwater outlets. Riverine sites tend to be uncommon and often have non-permanent hydrology. Livestock and agricultural land uses are commonly responsible for forming Depressional and Slope wetland sites in the Basin and Range region, for example irrigation and livestock ponds, and irrigation return flows. Flats sites were probably not common historically, and persist in being relatively rare (Adamus 2001).

Depending on the region, wetland sites may have been affected by alterations of water flow, sediment supply, and nutrient loading, all of which accompany agricultural activities that are common in the region (Adamus 2001). Relative degree of impact varies by locality, but common signs of manipulation include channelized streams, unnatural hydroperiods (more wet or dry than would be expected naturally, and altered flow regimes), erosion/incised channels, and stunted vegetation growth (e.g., from grazing).

#### **4.1.2 Function Assessment Characterization for Study Area**

The Caliente alternative segment consists of five AUs, Eccles alternative segment one AU, and Mina implementing alternative one AU. Table 2 provides a summary of wetland function assessment data by AU. Descriptions of the seven AUs found in the Study Area are below.

As shown in Table 2, throughout all AUs many of the function capacities gravitated toward "moderate" scores (as defined in Methods section for the Oregon HGM "Judgmental Method"). Scoring ranged from 0.2 to 0.7, however most individual functions within AUs were judged on the basis of scoring variables to perform at

capacities between 0.4 and 0.6 – “moderate.” Evaluation of scoring variables is provided in the wetland function assessment data sheets (Appendix A) for each AU. The most likely justification for the strong tendency toward moderate functional scores throughout the study area concerns existing land use and water management related factors that serve to limit higher existing function capacity. Examples include streambank incision, irrigation inputs and grazing effects on vegetation.

Although scores trend toward moderate, Table 2 exhibits variation between AUs in terms of which functions perform at relatively higher or lower capacity, as well as consistency of scoring across a suite of functions. For example, AU-3 has only one “low” (0.3) function score in comparison to 11 “moderate” function scores. This AU is characterized by fairly balanced function capacities and is solidly “moderate” in overall functional terms. In contrast, the individual function scores for AU-6 range from 0.2 – 0.6 and generally speak to a greater mixture of low and moderate function capacities in that system. Ultimately there are no *de facto* more “important” function capacities, while these may sometimes be determined from a policy standpoint on the basis of regulatory policies or regional issues (e.g., flood control needs would value “*Water Storage and Delay*” function capacity highly). By simply evaluating baseline functional characteristics of wetlands within the study area, however, an assessment of what types and levels of function may be impacted by the proposed project can be articulated and carried through to mitigation goals and objectives.

#### 4.1.2.1 AU-1

##### *AU Description*

Assessment Unit 1 is classified as RFT and includes wetlands located within the incised portion of the Meadow Valley Wash. This assessment unit is bounded to the north by the bridge at the southern end of Indian Cove, to the west by Highway 93, to the east by rocky bluffs, and to the south by the town of Caliente (Figures 3a and 3b). The bridge at the AU’s north end is located at a bend in the streambed and is armored at the outside meander (on the east side of the bridge) to protect adjacent agricultural land from erosion. This meander control, together with the highway constriction located along and parallel to the west side of the creek, have apparently caused MVW to become incised, separating it from its active floodplain. Wetland hydrology is directly associated with surface water and groundwater (alluvial) as most wetlands are contained within the banks of the waterways, or occur along adjacent lower floodplain areas.

Wetlands would only occur along the seasonally-wetted fringes of MVW except that beaver are active in this area and have constructed three or more beaver dams within the AU. This results in a complex of pools and glides that are highly dynamic; any large storm event would likely blow out one or more dams, resulting in an altered system and loss of wetland area associated with the dams until such time that they are rebuilt. The riparian community that has formed on the narrow, active floodplain bench along the stream is characterized by mature cottonwood and alder with a robust scrub-shrub community below. Trees that appear both dead and dying are scattered within the riparian corridor, their condition assumed to result from both direct (e.g., trunk chewing

and felling) and indirect (e.g., prolonged inundation of roots behind dams) effects of beaver activity. Within the beaver ponds, dominant vegetation is comprised of cattails (*Typha latifolia*) and bulrush (*Scirpus acutus*).

#### *Summary of Functional Characteristics*

As a dynamic RFT HGM classification AU, this unit is characterized by generally moderate functional capacity. Only two scores were at or below 0.3 (“low” function class”). Variables that differentiate AU-1 include:

#### Site-specific variables that tend to support higher function capacity scores:

- High proportion of wetlands inundated at least seasonally along the fringes of, and interspersed within the waterway banks contributes to several aspects of functioning; example of function supported – *Water Storage and Delay*.
- Good (ranging 70-80% areal cover) tree canopy and complex riparian/wetland vegetation structure with shrub and emergent (e.g., cattails) vegetation types, dominated by native species characteristic of the region; example of function supported – *Thermoregulation*.
- High interspersed of wetland, riparian and open water habitats; example of function supported – *Support of Characteristic Vegetation*.

#### Site-specific variables that tend to support lower function capacity scores:

- Steep, incised banks that prohibit more adjacent, lower-lying wetland and/or floodplain areas to serve as habitat, and associated erosion factors; example of function negatively impacted – *Amphibian and Turtle Habitat*.

#### 4.1.2.2 AU-2

##### *AU Description*

Assessment Unit 2 includes all of the wetland pasture located throughout the Caliente Alternative Segment (Figures 3b – 3f). Since these pastures slope gently toward the south in landscape context, the entire AU was classified under the Oregon HGM method as “Slope” class. This denotes the dominance of horizontal water movement toward the south.

Portions of the wetlands in this AU may be flooded by MVW during flood events, but the majority of the area consists of gently sloping pastures with hydrological sources from a combination of natural springs and irrigation diversions (from MWV). On the basis of observing a lack of field indications of past inundation, this AU appears to have prominent (i.e., contiguous across the surface of pastures) surface flooding greater than a few inches in depth less than once in every two years. These wetlands are likely more consistently saturated and/or ponded (e.g., “puddles”) in winter and spring than in summer/fall. However due to high variation in regional precipitation regime, there are exceptions including observations of saturation and surface sheetflow during mid-summer.

Wetlands in this AU are characterized by active grazing management. Vegetation is generally grazed to within a few inches of the ground surface. Vegetation is typically a mixture of inland saltgrass (*Distichlis spicata*), common spikerush (*Eleocharis palustris*), and Baltic rush (*Juncus balticus*). Little to no tree or shrub vegetation exists within this AU.

#### *Summary of Functional Characteristics*

As a Slope HGM classification AU, this unit is characterized by generally moderate functional capacity. Only two scores were at or below 0.3. Two functions (*Thermoregulation* and *Resident Fish Habitat Support*) are non-applicable to this AU. Variables that differentiate AU-2 include:

#### Site-specific variables that tend to support higher function capacity scores:

- High proportion of wetlands saturated or inundated at least seasonally within the gently sloping pasture setting; example of function supported – *Nitrogen Removal*.
- Shallow, slow-moving water typically present during spring season – example of functions supported – *Amphibian and Turtle Habitat, Wintering and Migratory Waterbird Support*.
- Although impacted by grazing, fairly consistent vegetation cover by vascular plants, mostly grasses, sedges and rushes; example of function supported – *Primary Production*.

#### Site-specific variables that tend to support lower function capacity scores:

- Lack of trees/shrubs, grazed pasture grasses in many areas; example of function negatively impacted – *Support of Characteristic Vegetation*.
- Lack of diverse plant species and plant morphological forms, generally speaking. Certain areas/patches within AU-2 provide exceptions, for example areas containing a mixture of bulrush, sedge, grasses and seasonally ponded water. A greater proportion of AU-2 consists of less vegetatively diverse, grazed pastures; example of function negatively impacted – *Invertebrate Habitat Support*.

#### 4.1.2.3 AU-3

##### *AU Description*

Assessment Unit 3 includes all of the wetlands located within the active floodplain of Meadow Valley Wash (Figures 3c – 3d and 3f – 3j). The majority of this AU along the alignment is isolated from cattle. An example of this wetland category is at the southern end of Meadow Valley meadow. These wetlands are generally inundated or saturated during high stream flows on an annual basis, and exhibit visibly flowing water during (at minimum) the wet season. As such, the AU is classified as RFT. Hydrology for these wetlands is derived from overbank flooding and alluvial groundwater, with likely localized inputs from shallow groundwater moving through AU-2 Slope wetlands.

Wetlands in AU-3 are often well-connected to the adjacent floodplain (primarily comprised of wetland pasture), and in localized areas disconnected due to incised banks. Incision is generally less prominent than in the setting described under AU-1 (e.g., 3 ft. vs. 15 ft. of observed erosional bank).

Due to less significant cattle influence, vegetation in this AU is fairly well-established and characterized by a diverse assemblage of native wetland forbs including clustered field sedge (*Carex praegracilis*), hardstem bulrush (*Scirpus acutus*) and Nebraska sedge (*Carex nebrascensis*). Trees and shrubs are uncommon within these wetlands but portions of the wetlands are shaded by adjacent upland shrubs that form patches resembling small hedgerows amidst an expansive pasture setting.

#### *Summary of Functional Characteristics*

As a RFT HGM classification AU, this unit is characterized by generally moderate functional capacity. Only one score was at or below 0.3. Characteristics that distinguish AU-3 from AU-1 include landscape setting (more rural, grazed pastures adjoining) and geomorphic setting in more gentle, meandering upgradient valley. Generally speaking, AU-3 is characterized by lower erosional forces, more gentle streambanks and greater connectivity of open water channels to the floodplain terrace, via intervening wetland areas along the fringes of the wash. Variables that differentiate AU-3 include:

#### Site-specific variables that tend to support higher function capacity scores:

- Shallow water and large proportion of seasonally inundated wetlands, including at least moderate presence of relatively permanent water; example of functions supported – *Resident Fish and Invertebrate Habitat Support*.
- Lack of appreciable non-native invasive species abundance, patches of shrubs/trees and mixed vegetation types in surrounding land cover; example of functions supported – *Songbird Habitat Support*.
- Diverse assemblage of native wetland plants, particularly herb-layer, that is relatively less impacted by cattle grazing (i.e., in comparison with AU-2 pastures); example of function supported – *Support of Characteristic Vegetation*.

#### Site-specific variables that tend to support lower function capacity scores:

- Assumption that seasonally inundated surface water is variable and moves through the riverine system with less opportunity to be stored or delayed; example of function negatively impacted – *Water Storage and Delay*.

#### 4.1.2.4 AU-4

##### *AU Description*

Assessment Unit 4 includes several linear wetland fragments that are generally located along the base of the abandoned railroad bed and U.S. Highway 93 (Figures 3b – 3d). Prior to original construction of the abandoned railroad bed and U.S. Highway 93, many of these wetlands were likely to have been contiguous with wetlands classified as AU-2.



Like AU-2 wetlands, water movement is along a gently sloped gradient from north to south through the valley, and they are classified as Slope wetlands. Unique to these narrow, linear wetland fragments, they are likely augmented by an additional surface sheet-flow component due to the lower ratio of wetland-to-upland boundaries associated with the linear shapes. The upland boundaries are typically sloped and likely contribute surface run-off associated with precipitation events. While AU-4 wetlands are primarily characterized as narrow Slope wetland, the probable secondary influence of surface sheet-flow is an attribute typical of Depressional HGM wetlands (Section 3.2.2.1, above).

From a vegetation perspective, AU-4 wetlands appear generally degraded due to the fragmentation effects and encroachment by more non-native, ruderal species. Typical species include those found in AU-2 wetland pastures, with the addition of non-native grasses such as redtop (*Agrostis gigantea (alba)*), quackgrass (*Agropyron repens*), and annual rabbitsfoot grass (*Polypogon monspeliensis*).

#### *Summary of Functional Characteristics*

AU-4 is classified in HGM as a Slope wetland and is characterized by a generally low functional capacity (many scores of 0.3) relative to the other AUs. Nine of the function scores were at or below 0.3. Two functions (*Thermoregulation* and *Resident Fish Habitat Support*) are non-applicable to this AU.

Characteristics that distinguish AU-4 from the other Slope wetland unit, AU-2, include a fragmented, linear character and generally less opportunity to perform at similar function capacity due to differing hydrological attributes. These include less surface water dispersion and less complex internal flow paths, and a presumption of less surface water in general since AU-2 receives irrigation inputs. Some AU-4 wetlands are hydrologically connected via culverts or ditches to AU-2 wetlands, but generally speaking do not support extended surface inundation that sheet-flows slowly toward the south, which characterizes a primary aspect of the AU-2 hydrology. Variables that differentiate AU-4 include:

#### Site-specific variables that tend to support higher function capacity scores:

- The only function of AU-4 that scored above a 0.3 was *Primary Production* (0.4). A lower-end of moderate score for this function was supported by variables such as consistency of vascular plant cover and a contributing watershed that lacks extensive paved/developed surfaces.

#### Site-specific variables that tend to support lower function capacity scores:

- Lack of year-round surface water and low interspersions of surface water within AU; example of function negatively impacted – *Nitrogen Removal*.
- Lack of diverse plant species and plant morphological forms, generally speaking. Trees and shrubs are generally lacking. The primary proportion of AU-4 consists of grazed linear depressions with pasture grasses; example of function negatively impacted – *Support of Characteristic Vegetation; Songbird Habitat Support*.

#### 4.1.2.5 AU-5

##### *AU Description*

Assessment Unit 5 includes wetlands associated with deeper water, basin topography (e.g., pond to the north of Indian Cove Staging Yard Option). This AU is found in Figures 3c and 3d. These wetlands classify as Depressional under the HGM framework. Wetlands in this AU in the study area may have formed or been influenced toward deeper-water wetlands as a result of probable human activities such as excavation/borrow (e.g., CC12, PBS&J 2006, Figure 4H) and construction of berms (e.g., old railroad bed) that serve to interrupt downslope water movement.

The AU-5 wetlands are generally perennial in character, but occasionally dry out. As such the hydrologic regime is semi-permanent in nature. Patches of open water and vegetation may occur in characteristic “duck pond” fashion. With typically 1.5-3 feet of water depth, cattle have little impact except around the edges, which except for in the case of wetland CC12 consist of wetland pasture. As such, these wetlands typically support a less degraded vegetation community, and are characterized by wetter-tolerant vegetation. Hardstem bulrush is dominant in these wetlands, and wetland pasture species (similar to AU-2) occurs in drier areas.

##### *Summary of Functional Characteristics*

AU-5 is classified under the HGM framework as a Depressional wetland and is characterized by a strongly moderate functional capacity. All applicable function scores range between 0.5 – 0.7 for this AU, therefore it exhibits the ability to perform a variety of functions at a respectable capacity. Two functions (*Thermoregulation* and *Resident Fish Habitat Support*) are non-applicable to this AU. As the only Depressional HGM class AU in the study area, there are no AUs in the same class against which to contrast functional attributes of AU-5. The greatest contrast is therefore offered by its distinct HGM category and the suite of functions supported by factors directly related to its HGM setting. Primary among these is the relatively permanent water and pond-like characteristics that positively influence several habitat support functions (e.g., *Wintering and Migratory Waterfowl Support*) as well the function of *Water Storage and Delay*. Variables that differentiate AU-4 include:

##### Site-specific variables that tend to support higher function capacity scores:

- Large proportion of seasonally to semi-permanently inundated wetlands; example of functions supported – *As noted above, and Nitrogen Removal*.
- Shorelines are gently sloping and suitable basking sites are present; example of functions supported – *Amphibian and Turtle Habitat, Breeding Waterbird Support*.

##### Site-specific variables that tend to support lower function capacity scores:

- Microtopography and plant form variety are low-to-moderate in AU-5. This affected the score of such functions as *Primary Production* (0.5) and *Nitrogen Removal* (0.6). Even so, no function scored less than 0.5 for this AU.

#### 4.1.2.6 AU-6

##### *AU Description*

Assessment Unit 6 includes wetlands within the active and highly dynamic Clover Creek floodplain. These wetlands classify as RFT under the HGM framework. Clover Creek has seasonal flow, with a widely meandering low flow channel containing pockets of wetland formed on low terraces adjacent to the channel. The floodplain had been altered in the local area by railroad maintenance activities that had constricted the floodplain to protect the railroad embankment. The floodplain constrictions have been reversed following an EPA enforcement action in response to unauthorized filling of Waters of the US. However, effects of the constriction were readily apparent in the redirection of the main channel and erosion of uplands adjacent to the north (known as Dutch Flat).

Presence and extent of wetlands in this AU is likely dynamic from year to year. These wetlands are characterized by shrub and tree saplings. A dominant species in this AU includes the non-native invasive saltcedar (*Tamarix ramosissima*). Soils are comprised of recent flood deposits and are, thus, of a coarse granular texture with little development. As visible on Figure 4, riparian vegetation (outside of, but nearby AU-6) becomes more prominent in the western area of AU-6. The riparian area continues downstream (toward the west) and consists of mature riparian forest. An Area of Critical Ecological Concern (ACEC) by the Bureau of Land Management (BLM) has been designated an ACEC due to its potential to provide habitat for the federally protected southwestern willow flycatcher and Schlessers Pincushion. The Clover Creek ACEC is on the Union Pacific Railroad within the Lower Meadow Valley Wash. The Schlessers Pincushion ACEC is in common segment 1 approximately two miles west of Clover Creek.

##### *Summary of Functional Characteristics*

This RFT AU has highly distinct hydrogeomorphic character within its setting in the dynamic active floodplain of Clover Creek. While this AU scored moderately in general terms, its clear strength is in habitat support for characteristic vegetation, fish and wildlife. Scores for these functions ranged between 0.4 – 0.6. This is based on attributes such as the interspersed vegetative habitat features and dynamism and landscape variety of hydrologic regime across the wash. Functions more dependent on variables related to soil development, sediment stability and the ability to detain water did not score as highly for this AU, which is highly justifiable given the dynamic floodplain setting with active soil alluvial deposition, occasional high-velocity flow events and areas of substantial erosion.

#### 4.1.2.7 AU-7

##### *AU Description*

Assessment Unit seven includes the only wetland areas that would be permanently impacted by the Mina Implementing Alternative (Figure 5). This AU is located along the banks of the Walker River in the northwestern portion of the Mina Alternative. The wetlands are classified as RFT under the HGM framework, with primary hydrological influence associated with seasonal surface water, including bank overflow, and alluvial groundwater from the Walker River. These wetlands were not visited by URS field investigators because the potential direct wetland impacts are quite low (up to 300 square feet), and this is not the preferred alternative. The assessment of this AU is based on documentation provided in the Waters of the U.S. Determination Report for the Mina Rail Corridor (PBS&J 2007, all).

Hydrology of AU-7 wetlands is highly influenced by the controlled Walker River hydrologic system. As such flooding does not necessarily occur on the basis of natural seasonal cycles, but as a result of flow releases from upstream impoundments in high snowpack years in the Sierra Nevada. Off-channel wetlands within this AU (WRN-3 and WRN-4) (see DOE 2007, Figure F-17) would have even greater hydrologic variability than wetlands WRN-1 and WRN-2, which fringe the active channel of the Walker River. The off-channel wetlands are connected by topography and/or drainage channels (PBS&J 2007, Table 5) to the channel-fringing wetlands, resulting in a more complex habitat and hydrologic setting due to two subtypes of wetland landform setting.

##### *Summary of Functional Characteristics*

This RFT AU has a unique hydrogeomorphic character. Somewhat similar to the functional attributes described above for AU-6, the dynamic floodplain of the Walker River within which AU-7 occurs tends to modulate the functions that are more dependent on stability and development of soil/substrate characteristics (e.g., *Nitrogen Removal*). Habitat support-related functions scored between 0.4 – 0.6 which was supported by a variety of biotic and physical habitat features such as lack of nearby busy roads and complex water/vegetation interspersion.

A unique feature of AU-7 is the seasonally flooded, off-channel wetland habitat. This type of habitat, landform and hydrologic feature served to increase the score of several function capacities that lacking off-channel wetlands would have scored lower. Availability of seasonally flooded wetland areas outside of the main channel of the Walker River provides a suite of functional attributes including water storage, nutrient transformation, primary production, invertebrate and resident fish habitat support.

## **5. ENVIRONMENTAL CONSEQUENCES**

This section addresses direct, indirect, temporary and permanent impacts to wetlands on the basis of current project design. Project-related indirect impacts on water quality aspects of wetlands (and other waters) are assessed in greater detail in the Rail Alignment EIS (DOE 2007, Sections 4.2.5 and 4.3.5). To effectively address project impacts

associated with the fill of wetlands, both areal extent of direct impacts and predicted impairment of functional attributes from both direct and indirect impacts are evaluated.

The impact analysis provided in this report is consistent with DOE's evaluation of potential impacts to wetland resources based on the criteria of: "Would railroad construction or operations cause filling of wetlands or otherwise alter drainage patterns such that wetlands or waters would be adversely affected?" (DOE 2007, Table 4-54).

Direct alteration of wetlands (e.g., by placement of fill) and indirect impacts to wetlands by nearby activities could potentially result in the loss of physical, ecological and biogeochemical functions typically provided by the existing wetland. Of the thirteen wetland functions evaluated by the Oregon HGM Method, 10-12 of these functions are associated with wetlands in the study area (depending on the specific AU). The distinction between 10 and 12 occurs because only Riverine Flow-through sites (AU-1, AU-3, AU-6 and AU-7) support *Thermoregulation* and *Resident Fish Habitat Support* functions. Table 3 provides a summary of direct and indirect wetland impacts by project alternative/segment.

## **5.1 DIRECT EFFECTS**

Direct effects, as defined by NEPA, are those that are caused by the action and occur at the same time and place (40 CFR § 1508.8).

Note that the following analysis does not attempt to quantify relative "severity" of impacts to existing wetland function. Comparison of relative severity of such impacts is assumed to be proportionate to acreage of wetlands proposed to be directly impacted. For example, it would be assumed that a direct (filling) impact to 10 acres of Slope wetland AU-2 would have relative functional impacts approximately ten times that of direct filling impact to 1 acre of the same category (AU-2) of wetland. Such direct proportional assumptions are less useful when comparing different AUs, since primary functional characteristics differ between AUs.

### **5.1.1 Caliente Implementing Alternative**

#### **5.1.1.1 Caliente Alternative Segment**

Quantification of direct wetland impacts associated with the Caliente alternative segment, based on current project design assumptions<sup>1</sup>, results in an estimate of 7.11 acres (of which 6.94 acres are assumed jurisdictional) (Figures 2, and 3a – 3j and Table 1). The largest extent of direct impacts would be associated with two regions within the first five miles of the alignment: Indian Cove and southern Meadow Valley. These areas primarily support wetland pasture grazed year-round by cattle, and are irrigated with water diverted from Meadow Valley Wash, in addition to hydrological input by springs and other

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<sup>1</sup> Assumptions: a) within 55-ft. roadbed footprint; b) wetlands in incised washes to be crossed by bridges are assumed to be avoided.

subsurface water sources (e.g., alluvial aquifer). Direct impacts are further characterized below by each design component.

#### *Roadbed Construction*

Roadbed construction would directly impact 7.1 acres (6.9 acres of which is assumed jurisdictional) of wetlands, mostly consisting of AU-2 and AU-4 Slope HGM class grazed wetland pasture. Minor direct impacts to Riverine Flow-through wetlands (AU-1 and AU-3) could occur as a result of bridge placement over washes containing fringe/interspersed wetlands. The design goal, however, is to avoid direct wetland impacts to the maximum extent practicable in placement of bridge abutments and/or piers at such stream crossing points. Small direct impacts to Depressional (AU-5) wetlands would also occur as a direct effect of roadbed construction (see Table 3).

Given the predominance of the Slope wetland HGM class in this design component study area, primary existing functional capacity is reflective of the summary above for AU-2 and AU-4.

Primary direct impacts to existing wetland function associated with wetland fill in AU-2 and AU-4 wetlands may include a reduction of the Slope HGM class wetlands' function capacity in:

- Due to reduction in area of active floodplain on the basis of wetland fill:
  - Water Storage and delay/flood abatement
- Due to reduction in wetland area available to perform function:
  - Nitrogen removal
  - Sediment and phosphorus retention
  - Amphibian habitat support
  - Migratory and wintering waterfowl habitat support

#### *Interchange Yard*

There are no wetlands or other surface water features in this area, therefore there would be no direct or indirect wetland impacts.

#### *Staging Yard*

##### **Indian Cove Staging Yard**

Construction of the Indian Cove Staging Yard would require the wetlands to be filled above the level of the floodplain. It might also require an active drainage system and a channel around the eastern edge of the site to keep the area dry and in a stable condition. Construction of the Staging Yard in Indian Cove would require filling up to 47 acres of wetlands, consisting entirely of AU-2 Slope HGM class grazed wetland pasture (Figure 3b, northern portion). Primary existing functional capacity is reflective of the summary above for AU-2.

Primary direct impacts to existing wetland function associated with wetland fill in AU-2 wetlands may include a reduction of the Slope HGM class wetlands' function capacity in

the below-listed functions. Based on the large acreage of potential impact within a localized setting that this staging yard option presents, the relative impact to function of AU-2 wetland would likely be much more substantial than that incurred by smaller amounts of roadbed fill over a longer linear distance as described for the Roadbed component of the Caliente alternative.

- Due to reduction in area of active floodplain on the basis of wetland fill:
  - Water Storage and delay/flood abatement
- Due to reduction in wetland area available to perform function:
  - Nitrogen removal
  - Sediment and phosphorus retention
  - Amphibian habitat support
  - Migratory and wintering waterfowl habitat support

#### **Upland Staging Yard**

This Staging Yard site is within and adjacent to an agricultural field in Meadow Valley. One or more sets of tracks at the north end of this yard would cross Bennett Springs Wash, a water of the United States. A bridge would be constructed to cross Bennett Springs Wash, and no fill would be placed in the wash. DOE will avoid filling the isolated wetland immediately to the west of the Upland site by constructing the staging yard to the west of the abandoned rail roadbed. Therefore, no fill of wetlands or other waters of the United States will be required to construct the Staging Yard at the Upland site.

Note that there is an isolated wetland (WT-30; DOE 2007 Figure F-6), immediately to the west of the Upland site, in a swale adjacent to the abandoned rail roadbed. Wetland WT-3 is confined to the lower part of the swale where water ponds and it has no apparent surface connection to Meadow Valley Wash or its tributaries (PBS&J 2006, Table 6). Due to lack of proposed direct impacts and unlikely indirect impacts to this wetland, it is documented in Table 1 as being not included in the functional assessment.

#### ***Quarry Siding***

The Quarry Siding would directly impact 1.5 acres of wetland in the Slope HGM class (AU-2) (Table 3). Primary existing functional capacity is reflective of the summary above for Indian Cove Staging Yard for AU-2 wetland impacts.

#### **5.1.1.2 Eccles Alternative Segment**

##### ***Roadbed Construction***

Minor direct impacts to Riverine Flow-through wetlands (AU-3) could occur as a result of bridge placement over Meadow Valley Wash, which contain fringe/interspersed wetlands. The design goal, however, is to avoid direct wetland impacts to the maximum extent practicable in placement of bridge abutments and/or piers at such stream crossing points.

Primary direct impacts to existing wetland function associated with potential minor wetland fill in AU-3 Riverine Flow-through wetlands include both short-term and long-term minor reduction in wetland habitat support, including resident fish, invertebrate and songbird.

#### *Interchange Yard*

Construction of this yard would require dikes and riprap in Clover Creek to provide the necessary embankment, maintain stream bed characteristics, properly direct water, and protect the siding (Nevada Rail Partners 2007) and DOE 2007, Figure 2-43. Portions of the south bank of Clover Creek would be filled to a height of 6 feet or more to elevate the site out of the floodplain to the height of the existing tracks. For construction of the interchange tracks, the fill would extend approximately 50 to 75 feet into the creek for a length of approximately 4,600 feet along the creek. For construction of the interchange siding, the fill would extend approximately 25 feet into the ephemeral creek bed for a length of approximately 3,000 feet on the east end and 2,000 feet on the west end of the interchange tracks. The total area to be filled in Clover Creek for construction of the siding would be approximately 8.2 to 11 acres, depending on the width of the fill.

The active stream channel along this portion of Clover Creek is approximately 1 foot deep (PBS&J 2006, Table 3). The volume of fill placed in the stream floodplain (note, not the active channel) would be approximately 13,000 to 17,000 cubic yards, and the total volume of fill required to extend and raise the south bank of Clover Creek 6 feet or more to the height of the existing track would be about 85,000 to 110,000 cubic yards.

There are five small wetlands along the section of Clover Creek where the Interchange Yard would be constructed. None of these wetlands would be permanently filled to construct the yard. However, three of these wetlands are in Clover Creek and could be indirectly impacted if the flow of Clover Creek is redirected or otherwise affected by filling and stabilizing the south bank of that stream.

Extensive wetlands occur downstream approximately 0.5 - 6.0 miles of the proposed location of the Eccles Interchange Yard, toward the confluence of that creek and Meadow Valley Wash within the City of Caliente. These are mentioned due to potential for indirect impacts to downstream wetlands as a result of developing the Interchange Yard. Please refer to Section 5.1.1.2 of this TM.

#### *Staging Yard*

The Staging Yard for the Eccles alternative segment would be located in Meadow Valley about 3,000 feet east of U.S. Highway 93 (DOE 2007, Figure 2-5). No wetlands were identified within the Staging Yard area, therefore no wetlands would be directly or indirectly impacted.

### **5.1.2 Mina Implementing Alternative**

The only wetlands along the Mina alternative are associated with the Walker River in an area that would require a bridge crossing. They consist of RFT HGM classification (AU-7) (Figure 5) and were included in the functional assessment due to the potential for small



direct, and possible indirect construction impacts. Primary existing functional capacity is reflective of the summary above for AU-7.

Minor direct impacts to these wetlands could occur as a result of bridge placement over washes containing fringe/interspersed wetlands. Up to 14 bridge piers would be placed in the wetlands adjacent to the Walker River. No other permanent fill would be placed in these wetlands.

Primary impacts to existing wetland functions associated with potential minor wetland fill in AU-7 wetlands include both short-term and long-term minor reduction in wetland habitat support, including resident fish, invertebrate and songbird.

## **5.2 INDIRECT EFFECTS**

**Indirect effects** are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use; population density or growth rate; and related effects on air, water, and other natural systems, including ecosystems (40 CFR § 1508.8).

Indirect effects often associated with wetlands that are otherwise partially, or not directly impacted within a project area include, but are not limited to:

### *Short-term (Construction Period)*

- Water quality impacts associated with construction activities (e.g., erosion); and
- Indirect impacts to habitat functions due to nearby construction. Distance and relative severity are dependent on the environmental (e.g., water quality) and behavioral tolerances of particular fish and wildlife species. From a regulatory perspective this type of impact is most relevant to sensitive species that utilize wetlands for all or a portion of their life history.

### *Long-Term/permanent (Project Operation Period)*

- Changes to natural/pre-existing drainage patterns, particularly surface expressions but potentially shallow groundwater as well. This is inclusive of drainage interruption, constriction of water from a broad area to a single location (e.g., new culvert crossing);
- For wetlands located within active stream channels (e.g., those found in Clover Creek), potential alteration of localized hydraulic attributes (e.g., velocity, depth, hydroperiod) that may be indirectly affected by fill or excavation within non-wetland portions of the stream channel (e.g., bridge piers); and
- Potential addition of surface water runoff to adjacent/nearby wetlands due to soil compaction and/or new impermeable surfaces.

For purposes of this analysis, it was assumed that appropriate construction practices (e.g., BMPs) would minimize indirect impacts such as water quality degradation in wetlands. Treatment of construction and operation activities with the potential to degrade water quality in waters and wetlands is provided in the Rail Alignment EIS (DOE 2007, e.g., Section F.3.1.4), and is not reiterated in detailed fashion in this report.

Potential indirect impacts to existing wetland function tend to be very similar in relation to the type of wetland affected (e.g., RFT) and the type of activity proposed (e.g., bridge construction). For this reason, Table 3 provides a concise summary of primary indirect impacts reasonably foreseeable to occur.

## **5.2.1 Caliente Implementing Alternative**

### **5.2.1.1 Caliente Alternative Segment**

#### *Roadbed Construction*

Please refer to Table 3.

#### *Interchange Yard*

There are no wetlands or other surface water features in this area, therefore there would be no direct or indirect wetland impacts.

#### *Staging Yard*

##### ***Indian Cove Staging Yard***

Please refer to Table 3.

##### ***Upland Staging Yard***

There are no wetlands or other surface water features in this area, therefore there would be no direct or indirect wetland impacts.

#### *Quarry Siding*

Please refer to Table 3.

### **5.2.1.2 Eccles Alternative Segment**

#### *Roadbed Construction*

Please refer to Table 3.

#### *Interchange Yard*

The substantial fill area and volume that would be placed within the floodplain of Clover Creek to construct the interchange siding could have potentially large indirect impacts to wetlands occurring within Clover Creek. In contrast to wetlands documented within the study area of the Eccles alternative segment, such indirect impacts would be more likely to affect *downstream* of the interchange yard location. This area is within the Clover Creek ACEC which BLM has identified as an area of interest for the willow flycatchers.

Indirect impacts to downstream riparian-associated habitats, including wetlands, are possible due to the alterations in hydraulic properties that would occur as a result of fill placement in the active floodplain of Clover Creek. It is highly likely that hydraulic conditions would be modified as a result of fill placement. However, quantification of the degree and particular attributes of modified conditions cannot be addressed without formal hydraulic modeling of the applicable stream reach. Potentially dozens of variables would affect the degree of indirect impact, including timing and velocity of peak flows in Clover Creek, proportion of floodplain filled (area), depth and total volume of fill, substrate conditions, and the condition of the side channel after UP has completed their restoration and monitoring to the satisfaction of EPA.

Attributes of a modified hydraulic regime within Clover Creek that could indirectly affect downstream wetlands include changes in (likely increased) flow velocity and modification of various hydraulic forces. Given the great width of the floodplain in the interchange location and the high inherent variability of flow regimes in Clover Creek, it is less certain whether the depth and duration of local and downstream flow of water would be altered. However, hydrologic regime attributes could be determined from modeling and results applied in a predictive analysis of potential indirect impacts to existing wetlands.

The strong dynamism of the active Clover Creek floodplain also implies that accurate predictions from such a modeling analysis would benefit from inclusion of dynamic geomorphic processes. For example, if higher velocity flows increase erosional processes in certain areas of the floodplain, potentially preventing germination or establishment of in-stream wetland vegetation, the counteracting physical process is sediment deposition. In what potential places may the sediment resulting from increased erosion be redeposited, and would such deposition encourage origination or continued establishment of downstream wetlands?

#### *Staging Yard*

There are no wetlands or other surface water features in this area, therefore there would be no direct or indirect wetland impacts.

### **5.2.2 Mina Implementing Alternative**

Please refer to Table 3.

## **5.3 CUMULATIVE EFFECTS**

**Cumulative impacts** are defined by NEPA as the environmental impacts which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR § 1508.7).

The cumulative effects of past, present, and future foreseeable actions are described in detail by resource in Chapter 5 of the Rail Alignment EIS (DOE 2007) and will not be further listed in this TM. For the purpose of the herein analysis of cumulative effects, the total amount of impacts (acres) and loss of function could be considered an incremental contribution to cumulative total of wetland loss in the area of influence as described in Chapter 6 (DOE 2007). If the DOE provides mitigation for these losses the residual effect could be short-term and would be minimized. The contribution to the cumulative effects over time when added to the future foreseeable projects listed in Chapter 6 is expected to be minimal, and the combined total would be considered a small cumulative effect to wetlands and wetland function.

## **6. AVOIDANCE, MINIMIZATION AND MITIGATION**

### **6.1 AVOIDANCE AND MINIMIZATION**

Section 404(b)(1) of the CWA (40 CFR Part 230) requires a demonstration of the need to fill waters of the United States and a comparison of the aquatic resource impacts of alternatives to filling, so that the practicable alternative with the least impact to aquatic resources is selected. This requirement demonstrates that there are no practicable alternatives to filling a water of the United States, and that available steps have been taken to avoid, minimize, reduce, and mitigate the loss of that water as a result of the proposed action.

In addition to CWA Section 404(b)(1), pursuant to Executive Order 11990, *Protection of Wetlands*, each Federal agency is to avoid, to the extent practicable, the destruction or modification of wetlands, and to avoid direct or indirect support of new construction in wetlands if a practicable alternative exists.

A range of rail alignments were investigated through the NEPA process as documented in the Rail Alignment Draft EIS (DOE 2007). Waters of the US were considered together with multiple other factors in deciding on the final alternatives considered in the EIS. Upon selecting two implementing alternatives, the Caliente and Mina Rail Alternatives, the alternatives were further scrutinized in terms of avoidance and minimization.

When wetlands cannot be avoided in a proposed project area and efforts to minimize the project still result in unavoidable impacts, the ACOE mandates that the applicant provide compensatory mitigation based on the quantity and type of impact(s), and the perceived (or quantified) adverse effects, both direct and indirect, to existing wetland functional capacity. Section 404 regulations require that the applicant replace the lost wetland's area and functions by restoring, preserving, enhancing, or creating wetlands at varying ratios of mitigation acreage to affected acreage.

For the proposed project, in general, the areas that score highest in terms of functional capacity will be avoided or impacts therein will be minimized to stream crossings (e.g. AU-1, AU-3, and AU-5). The majority of wetland impacts throughout the Caliente

alternative segment would occur to AU-2 and AU-4, which are the relatively lower-scoring degraded pasture and fragmented wetlands (respectively).

## **6.2 CONCEPTUAL MITIGATION OPTIONS**

For the area of unavoidable impacts to wetlands and other waters proposed by either alternative, federal law (33 CFR Part 320.4 (r)) would require compensatory mitigation. To fully assess the mitigation opportunities for project alternatives and options, a design-level investigation of all existing opportunities for mitigation will be necessary. This investigation would include an assessment of available properties with potential to provide mitigation; discussions with landowners; and input, including at least one onsite meeting, with federal regulatory agency representatives.

This section only addresses compensatory mitigation for the placement and removal of fill in wetlands. Mitigation opportunities for water quality impacts due to increases in impervious surfaces and temporary, construction-related sediments and pollution are to be addressed in separate water quality reports, as summarized in Chapter 4, Section 4.6.2 of the EIS.

Temporary (short-term) impacts of construction, including vegetation trampling, soil compaction, and soil erosion, would be minimized by following best management practices (BMPs), and would be mitigated by post-construction site restoration measures. Typical BMPs include:

- Erosion control measures to minimize bare and exposed soils and to reduce transport of sediments to receiving water bodies, including wetlands,
- Installation of temporary stormwater facilities to control pollutants associated with construction,
- Staging in uplands,
- Limited access construction routes, and
- Use of mats when heavy machinery must operate from within wetlands.

Site restoration typically involves soil improvements, where necessary due to compaction, and revegetation using a native wetland seed mix (or woody plantings if such is impacted).

BMPs would also be included in the erosion control plans and construction drawings for the project. Proper maintenance and cleaning of construction vehicles before leaving the site would also help to reduce the amount of sediments or fuels and lubricants from reaching water bodies and help spread non-native plant materials.

### **6.2.1 Functional Replacement**

The majority of permanent direct wetland impacts would occur to pasture wetlands. More negligible impacts would occur at stream crossings if bridge piers cannot be designed outside of wetland riparian areas.

#### 6.2.1.1 Caliente Alternative Segment

Primary wetlands functions that may be adversely impacted as a result of selecting the Caliente alternative segment include:

- Flood abatement (due to reduction of active floodplain)
- Nitrogen removal
- Sediment and phosphorus retention
- Amphibian habitat support (limited)
- Migratory and wintering waterfowl habitat support

Based on the reduction of these functions, mitigation should include vegetation and/or hydrological (i.e., augmentation) enhancement consisting of dense, thin-stemmed emergent vegetation (e.g., bulrush) in an area(s) that receives annual inundation from stream flow during high water events. This type of action would result in functional lift for the suite of reduced functions listed above. Mitigation success would be enhanced by grading to provide microtopographic variation, such as grading for ponds and hummocks interspersed with flat to gently sloping gradients. Such "floodplain roughness" would benefit the mitigation site's function capacities in water quality management and habitat support for amphibians, invertebrates and waterfowl.

#### 6.2.1.2 Eccles Alternative Segment

Primary wetlands functions that may be adversely impacted as a result of selecting the Eccles alternative segment include:

- Resident fish habitat support
- Wintering/migratory waterbird support
- Songbird habitat
- Support for native wetland/riparian plant communities

Based on this assessment, mitigation for potential indirect wetland impacts associated with the Eccles alternative segment should include support of multi-strata, characteristic vegetation with a focus on restoring forested wetland to provide shade, primary production of organic materials (including woody debris), and placement of large woody debris or rock to influence the creation of shaded pools for resident fish. This second goal would also foster the development of habitat for wetland-dependent avian species. These goals can be accomplished by planting currently bare areas to obtain a palustrine thin-stemmed emergent class, palustrine scrub-shrub class, and palustrine forest class dominated by native vegetation<sup>2</sup>. Areas currently dominated by non-native saltcedar could be enhanced through weed control and maintenance. Because the riparian area in

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<sup>2</sup> Class refers to the Cowardin wetland classification system (Cowardin 1979). This system is used on the National Wetlands Inventory (NWI) maps to classify wetlands based on their dominant structural components. The NWI map for this project identifies only one wetland and the two creeks in the project area. This wetland was classified as Palustrine-Unconsolidated Bottom, Semi-permanently Flooded.

this part of Clove Creek is designated as an ACEC by the BLM, it is recommended that wetland mitigation include plantings that would benefit the southwestern willow flycatcher recovery goals for this area.

#### 6.2.1.3 Mina Implementing Alternative

Primary wetlands functions that may be adversely impacted as a result of selecting the Mina implementing alternative are similar to those listed above for the Eccles alternative segment, with some additions due to the unique off-channel wetland habitat adjacent to the Walker River:

- Resident fish habitat support
- Wintering/migratory waterbird support
- Songbird habitat
- Support for native wetland/riparian plant communities
- Flood abatement (due to off-channel wetlands)
- Primary production

#### **6.2.2 Types of Mitigation Opportunities**

A variety of mitigation options exist for compensating wetland impacts. These include the following:

On-site mitigation refers to conducting compensatory mitigation projects on the same parcel(s) where wetland impacts would occur. This is frequently the easiest option and may be the best one for minimizing the adverse impacts of developments in a given area. For example, if localized flooding is a problem, it is important to maintain local flood storage capability. Sometimes, however, on-site mitigation is not practicable (e.g., for small wetland impacts) or is not the best option for replacing wetland functions.

Off-site mitigation is when the mitigation site is not part of the development site. Instead, the mitigation project is constructed at some other appropriate site. Generally off-site mitigation is located within the same basin as the impact such that overall functional mitigation is provided to the affected watershed.

Purchase credits from a mitigation bank – A mitigation bank is a large wetland mitigation project constructed by a public entity or private party to compensate for future wetland impacts. There are specific rules for how a mitigation bank will be developed, operated, and monitored. "Credits" are the units of exchange. They are usually based on acre units (one acre impact = one credit) and their value is determined by the actual cost of creating the credit in the bank. Private bank sponsors include all land and operation costs and will also figure in a margin of profit. The purchase of credits from a wetland mitigation bank is not considered here due to the lack of an available wetland mitigation bank servicing this area of Nevada.

Restoration - Re-establishment of wetland and/or other aquatic resource characteristics and function(s) at a site where they have ceased to exist, or exist in a substantially degraded state. Restoration activities generally garner the best mitigation ratio (e.g. acres restored for acres impacted) relative to creation or enhancement activities.

Creation - The establishment of a wetland or other aquatic resource where one did not formerly exist.

Enhancement - Activities conducted in existing wetlands or other aquatic resources which increase one or more aquatic functions. Enhancement generally provides higher mitigation ratios (more mitigation acreage needed) than restoration or enhancement activities.

When wetland impacts cannot be avoided the DOE will need to mitigate the loss of impacted wetland functions and area. This is typically done by restoring, creating, or enhancing wetlands. A majority of the impacted wetlands are located near a busy roadway (U.S. Highway 93), and are within irrigated cow pasture land use, with a low diversity of plant species and vegetation strata. For this reason, off-site and/or out-of-kind mitigation may be more beneficial to watershed-level wetland functioning, both in terms of compensating for hydrologic functional characteristics (e.g., *Water Storage and Delay*) and habitat support functions (e.g., *Songbird Habitat Support*).

## **6.2.3 Conceptual Mitigation Opportunities by Implementing Alternative/Segment**

### **6.2.3.1 Caliente Alternative Segment**

- *On-site, In-kind Mitigation* - The DOE has at least two options for on-site, in-kind mitigation for the Caliente alternative segment:
  - **Option #1: Cattle Exclusion on Railroad ROW** - Fence the railroad ROW in wetland areas to exclude cattle impacts. Since the impact footprint is less than the proposed ROW, this would provide for a linear area of wetland adjacent to and parallel with the railroad embankment that would be protected from cattle impacts. The mitigation site would be approximately 100 feet wide by several thousand feet in length. This would be an enhancement action that would allow native vegetation to develop and potentially diversify in the absence of impacts associated with grazing. It is likely that as a result of this action, wetlands currently assigned to AU-2 would bear more vegetative similarity to wetlands in AU-3, consisting of a diverse array of erect, thin-stemmed native herbaceous vegetation.
  - **Option #2: Cattle Exclusion Elsewhere** - Because the railroad ROW crosses through local spring-fed pasture areas that are likely of high value to grazing managers, isolating cattle from the ROW may present a significant impact to ranching activities. For this reason, it may be more prudent in lieu of considering Option #1 to coordinate with local grazing managers/landowners on the



possibility of a landscape-level cattle exclusion area. This could allow continued use of the wetland pasture within the ROW, while a cattle exclusion area could be provided in an area of grazing land this is of little value (e.g., too wet) to landowners. Such an arrangement could be combined with conservation and/or tax incentives, or other contract agreements acceptable to all parties.

- *On-site, Out-of-kind Mitigation* - The DOE may look into adding to the robustness of their mitigation by amending in-kind mitigation elsewhere on-site with riparian plantings along the Meadow Valley Wash, particularly within their ROW. Due to presence of beaver in Meadow Valley Wash, trees are consumed at a large rate, and additional tree stock would help with habitat structure and shading for the stream.
- *Off-site, Out-of-kind Mitigation* - Wetland impacts may be mitigated at a watershed scale by such arrangements as a partnership with the BLM, or other land management agency to enhance riparian wetland habitat in the Rainbow Valley reach of Meadow Valley Wash. Public land in this area, located south of the Town of Caliente, is managed primarily by the BLM and is designated as an ACEC for the southwestern willow flycatcher and other habitat values. This area, although off-site, is within the same watershed as the project area. Opportunities to conduct enhancement in this area may include addressing areas susceptible to erosion (e.g., grading, bioengineering), planting riparian/wetland shrubs and trees targeting southwestern willow flycatcher habitat preferences, and enhancing in-stream habitat for resident fish, particularly the Meadow Valley Wash speckled dace and the Meadow Valley Wash desert sucker. Additional opportunities in this area may include fish passage barrier removals, in-stream debris removal, and native emergent wetland plantings (e.g., stream-side bench areas, off-channel wetland habitat).

#### 6.2.3.2 Eccles Alternative Segment

- *On-site, In-kind Mitigation* - Within the Clover Creek floodplain, the DOE may grade areas susceptible to erosion, bioengineer streambanks, realign dirt roads and trails that currently cross the floodplain away from the floodplain, control populations of noxious weeds (e.g., saltcedar), and/or plant wetland shrubs and trees to enhance willow flycatcher habitat and in-stream habitat for resident fish. Additional opportunities in this area may include in-stream debris removal and emergent native wetland plantings. Because of the potential indirect impacts to wetlands located downstream of the proposed Eccles staging yard impacts, wetland enhancement activities located downstream of the project area may be considered on-site. This area has the benefit of being owned by the BLM and managed for conservation as per the ACEC in this area.

It should be noted (as discussed earlier in this TM), that the extent of the downstream indirect impacts caused by the filling of Clover Creek for the interchange yard will not be completely understood until additional engineering design work is completed to confirm the amount and location of fill, and the associated hydrologic and hydraulic modeling is

completed. Likewise the feasibility of providing on-site, in-kind mitigation will not be known until such modeling is completed.

*On-site, Out-of-kind Mitigation* - The DOE may provide wetland enhancement to Wetland WT-7 (DOE 2007, Figure F-7). This wetland is surrounded by railroad embankments on both sides but is reported to have a surface water connection to Clover Creek. By enhancing this wetland with microtopographic manipulations (to increase variation) and tree plantings, the wetland could provide amphibian habitat and potentially off-channel resident fish habitat.

*Off-site mitigation, In-kind Mitigation* - Off-site mitigation opportunities described for the Caliente Rail Segment would also provide mitigation for the Eccles Rail Segment. However, for the Eccles segment, the Rainbow Valley Meadow Valley Wash enhancement activities would be considered in-kind.

#### 6.2.3.3 Mina Implementing Alternative

Because wetland acreage impacts are negligible at the Walker River Crossing, and do not consist of proposed activities that would likely have major effects on the existing system (e.g., such as berm construction that could block or redirect major drainage patterns), it is assumed that impacts to existing wetland functions would be proportionally minimal. It is likely that mitigation for the Mina implementing alternative wetland impacts could be provided by conducting wetland and riparian enhancement inclusive of the following suite of activities:

- Bank stability enhancement (grading, bioengineering, erosion control);
- Noxious weed control (focused on existing saltcedar vegetation);
- Tree and shrub planting for both habitat support and shading properties;
- Increasing microtopographic variation in the riparian and/or adjacent off-channel wetland areas;
- Providing habitat structures for wetland birds, mammals, and amphibians; and
- Providing an area(s) of exclusion from cattle grazing within the riparian and/or off-channel wetland area(s).

## **7. PREPARERS**

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Reviewer: Pearson, Dautis, B.A., General Biology. Senior Environmental Planner/NEPA Coordinator since 1989.

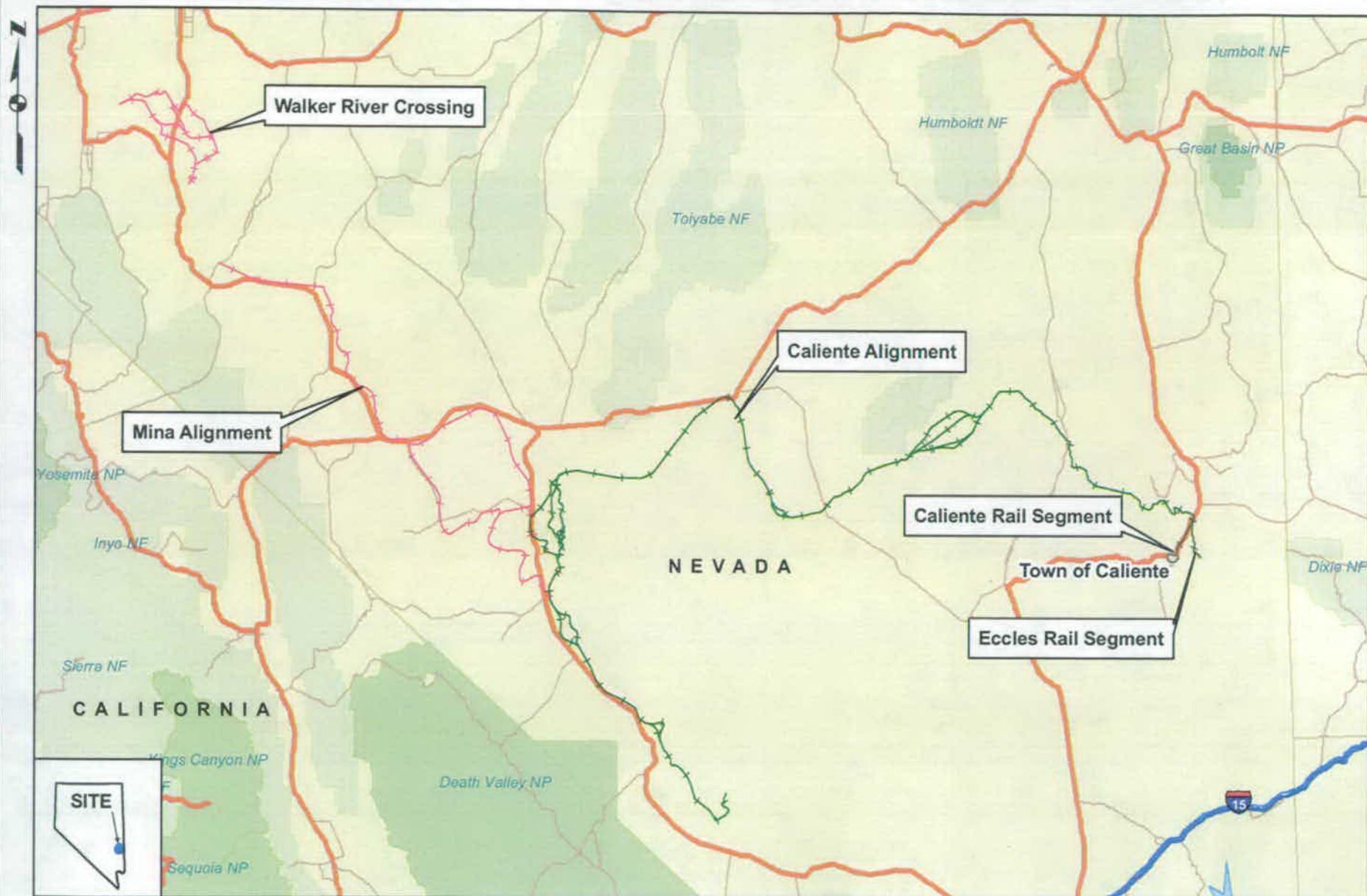
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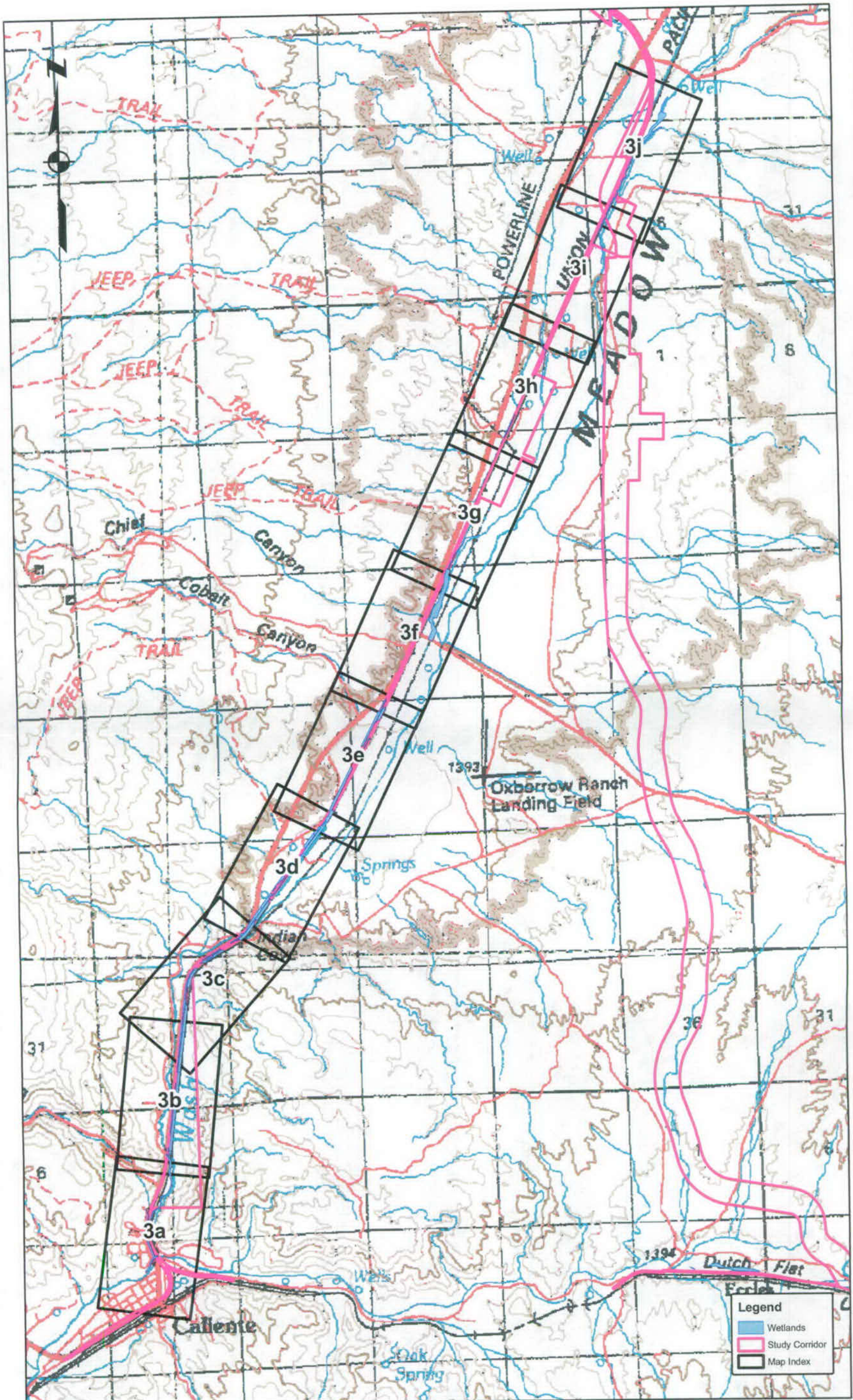
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## **FIGURES**







Source: Caliente, NV USGS  
Topographic 1:100K series.

**URS**

0 2,500 5,000 Feet

0 1,000 2,000 Meters

**CALIENTE RAIL SEGMENT FUNCTIONAL ASSESSMENT UNIT INDEX MAP**

MARCH 2008  
39400113

DEPARTMENT OF ENERGY  
RAIL ALIGNMENT FOR GEOLOGIC REPOSITORY AT  
YUCCA MOUNTAIN, NEVADA PROJECT

**FIGURE 2**





Sources: Imagery - NAIP 2005 Lincoln County Mosaic.

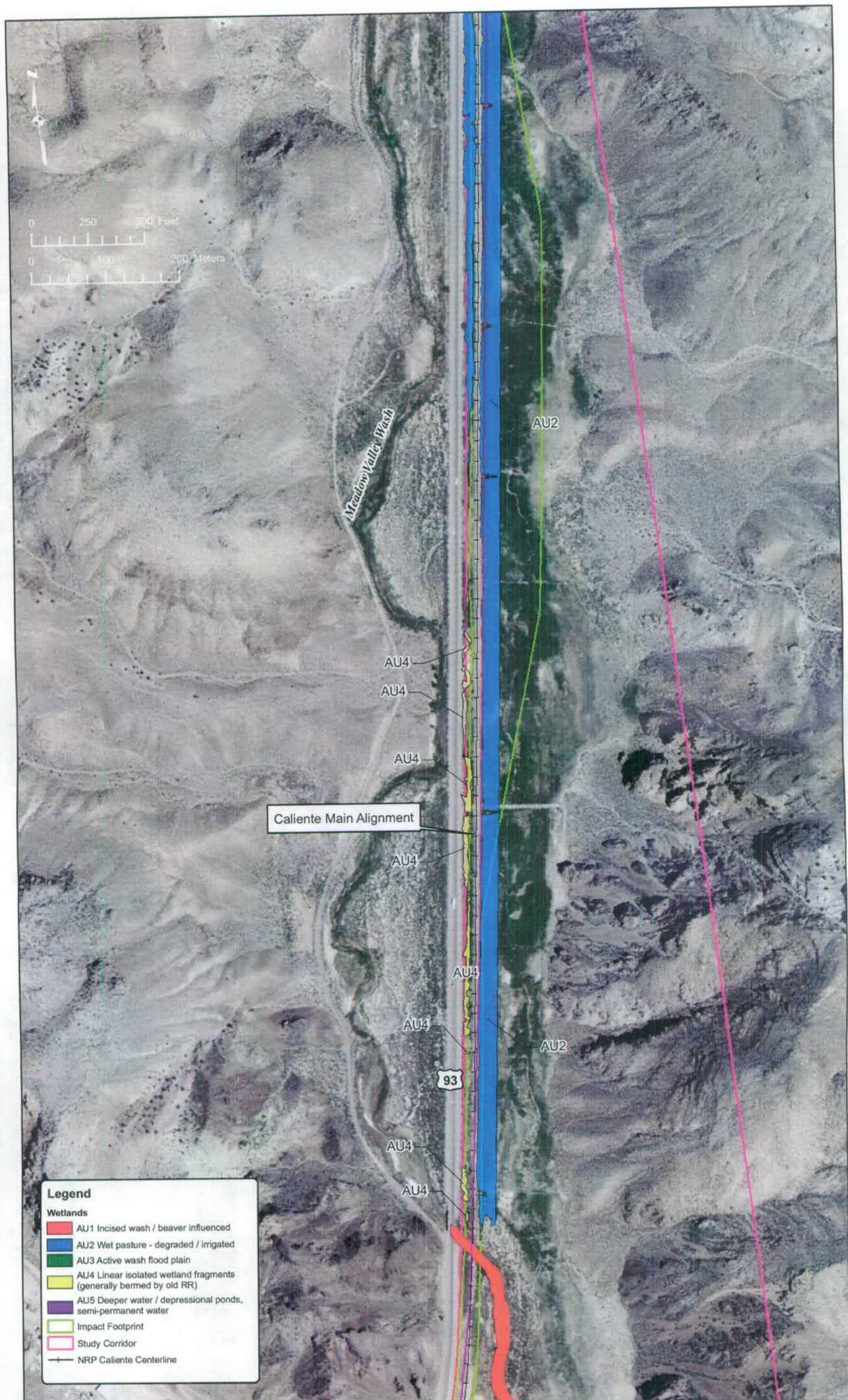
# CALIENTE RAIL SEGMENT FUNCTIONAL ASSESSMENT UNITS

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39400113

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RAIL ALIGNMENT FOR GEOLOGIC REPOSITORY AT  
YUCCA MOUNTAIN, NEVADA PROJECT

FIGURE 3a





Sources: Imagery - NAIP 2005 Lincoln County Mosaic.

# CALIENTE RAIL SEGMENT FUNCTIONAL ASSESSMENT UNITS

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RAIL ALIGNMENT FOR GEOLOGIC REPOSITORY AT  
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FIGURE 3b





Sources: Imagery - NAIP 2005 Lincoln County Mosaic.

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RAIL ALIGNMENT FOR GEOLOGIC REPOSITORY AT  
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**FIGURE 3c**





Sources: Imagery - NAIP 2005 Lincoln County Mosaic.

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RAIL ALIGNMENT FOR GEOLOGIC REPOSITORY AT  
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FIGURE 3d

**URS**





Sources: Imagery - NAIP 2005 Lincoln County Mosaic

# CALIENTE RAIL SEGMENT FUNCTIONAL ASSESSMENT UNITS

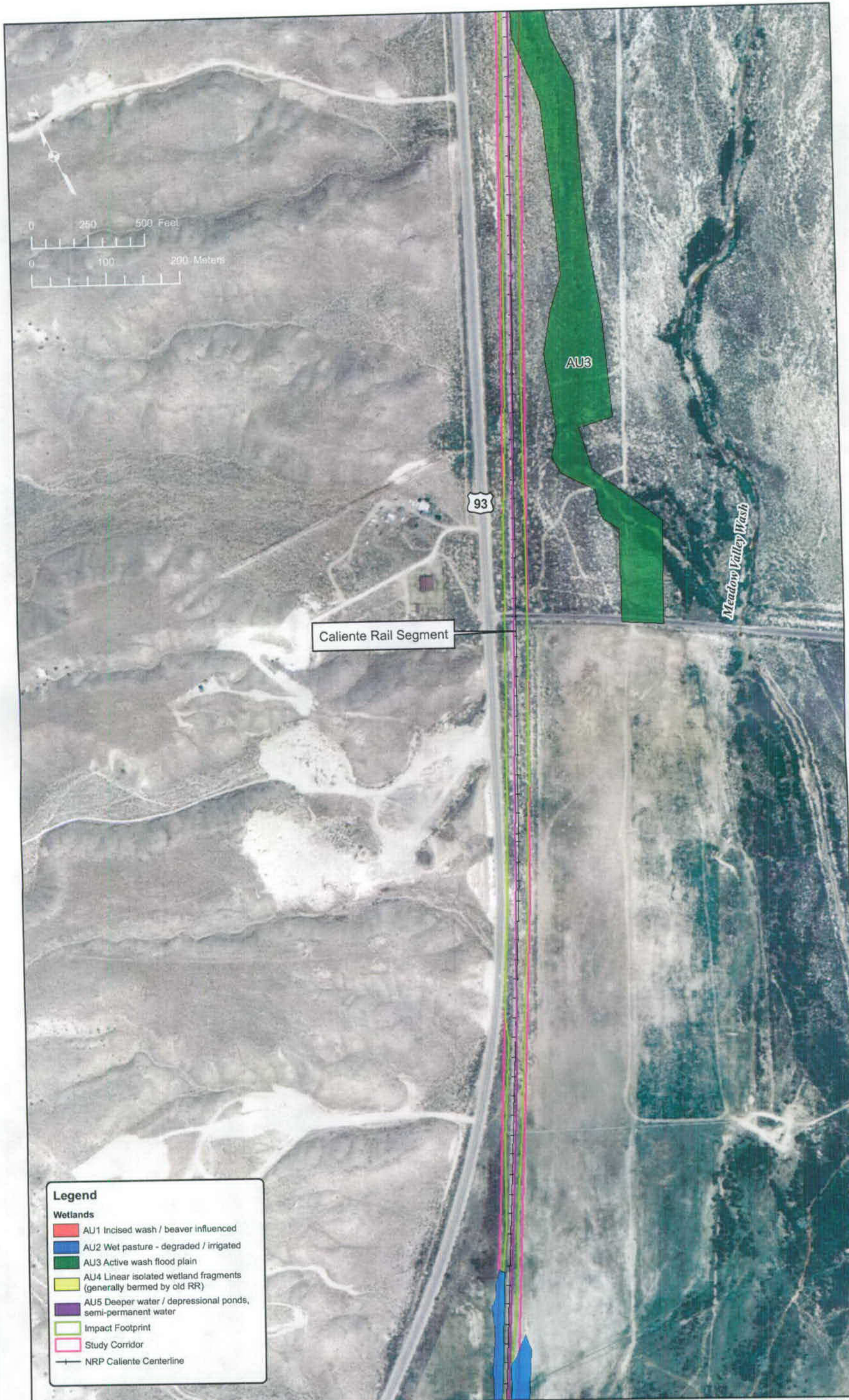
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RAIL ALIGNMENT FOR GEOLOGIC REPOSITORY AT  
YUCCA MOUNTAIN, NEVADA PROJECT

FIGURE 3e

**URS**





Sources: Imagery - NAIP 2005 Lincoln County Mosaic.

# CALIENTE RAIL SEGMENT FUNCTIONAL ASSESSMENT UNITS

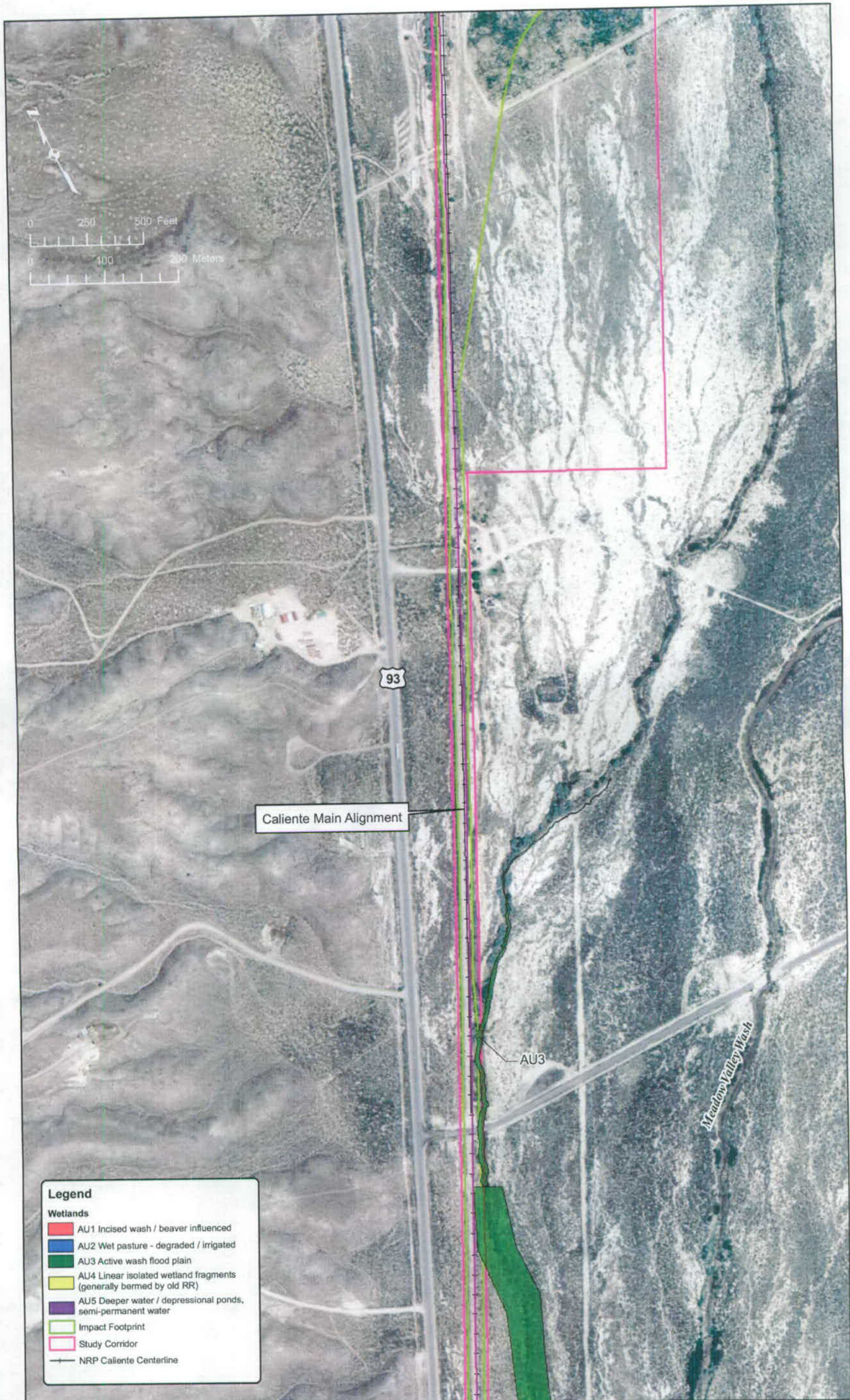
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YUCCA MOUNTAIN, NEVADA PROJECT

URS

FIGURE 3f





Sources: Imagery - NAIP 2005 Lincoln County Mosaic.

# CALIENTE RAIL SEGMENT FUNCTIONAL ASSESSMENT UNITS

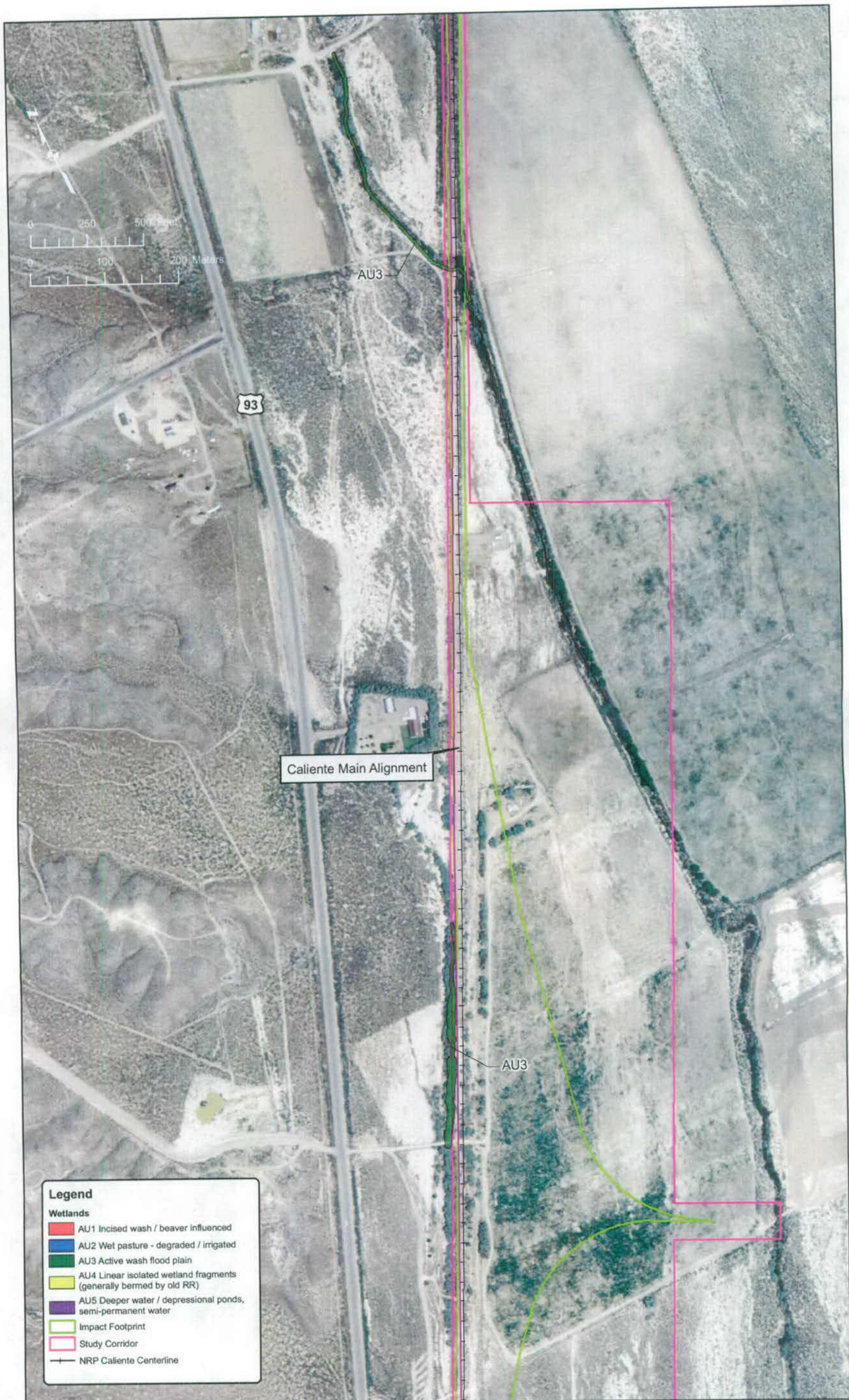
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RAIL ALIGNMENT FOR GEOLOGIC REPOSITORY AT  
YUCCA MOUNTAIN, NEVADA PROJECT

FIGURE 3g





Sources: Imagery - NAIP 2005 Lincoln County Mosaic.

# CALIENTE RAIL SEGMENT FUNCTIONAL ASSESSMENT UNITS

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RAIL ALIGNMENT FOR GEOLOGIC REPOSITORY AT  
YUCCA MOUNTAIN, NEVADA PROJECT

FIGURE 3h





Sources: Imagery - NAIP 2003 Lincoln County Mosaic.

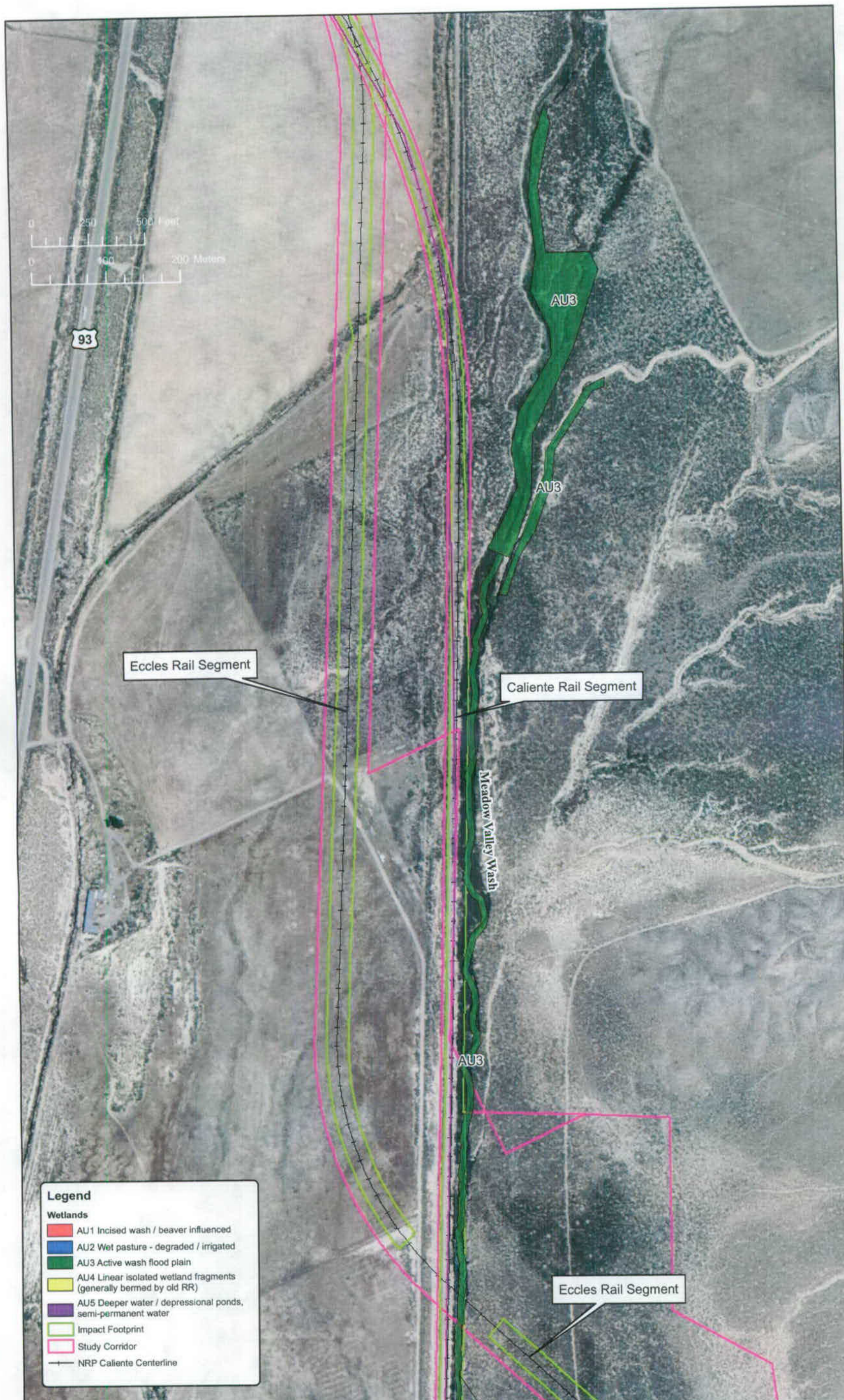
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DEPARTMENT OF ENERGY  
RAIL ALIGNMENT FOR GEOLOGIC REPOSITORY AT  
YUCCA MOUNTAIN, NEVADA PROJECT

FIGURE 3i





Sources: Imagery - NAIP 2005 Lincoln County Mosaic.

# CALIENTE RAIL SEGMENT FUNCTIONAL ASSESSMENT UNITS

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RAIL ALIGNMENT FOR GEOLOGIC REPOSITORY AT  
YUCCA MOUNTAIN, NEVADA PROJECT

FIGURE 3j





Source: Imagery - NAIP 2005 Lincoln County Mosaic.

**URS**

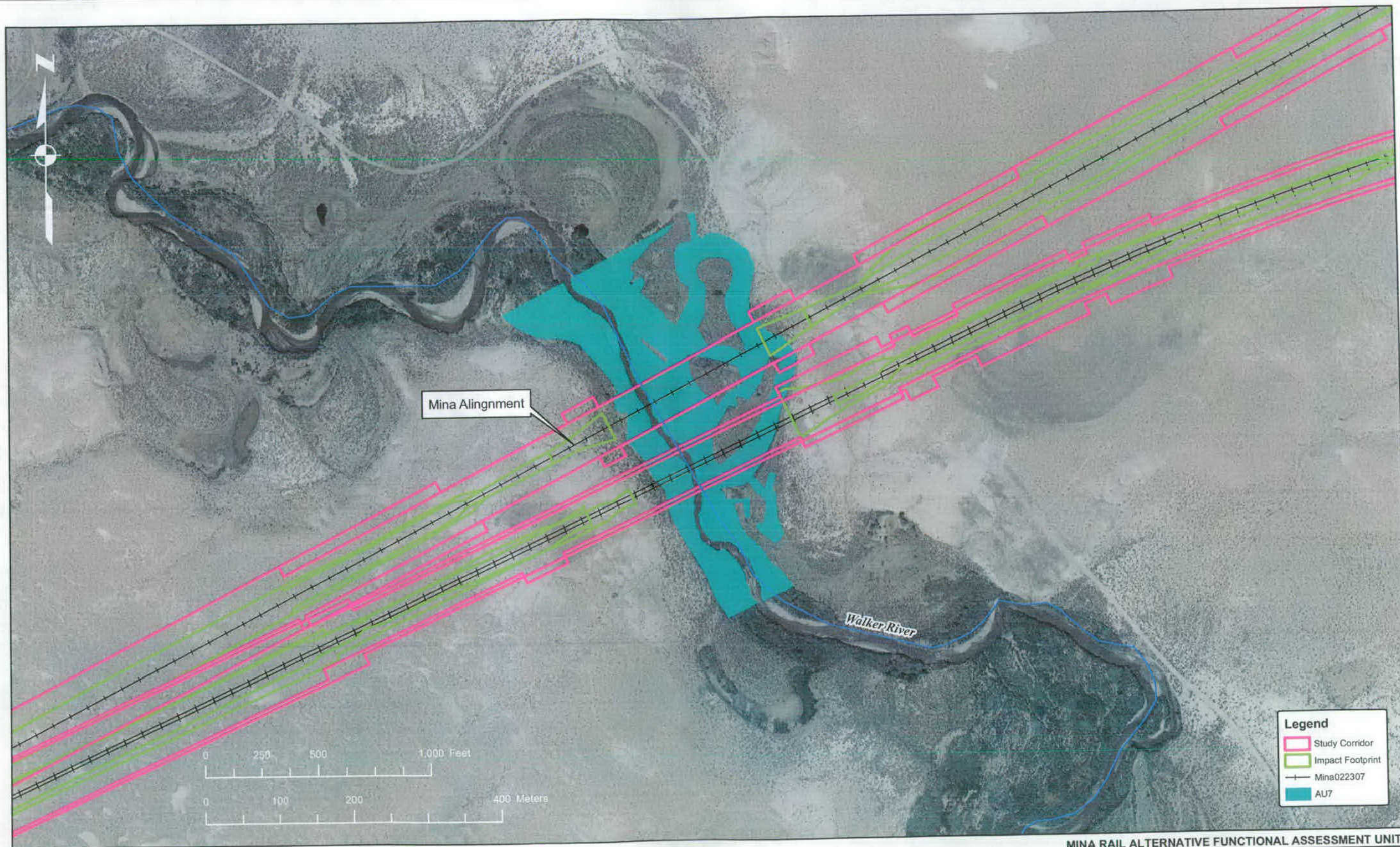
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**ECCLES RAIL SEGMENT FUNCTIONAL ASSESSMENT UNITS**

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RAIL ALIGNMENT FOR GEOLOGIC REPOSITORY AT  
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**FIGURE 4**





Source: BSC Imagery.

**URS**

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**MINA RAIL ALTERNATIVE FUNCTIONAL ASSESSMENT UNITS**

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**FIGURE 5**



## **TABLES**

**TABLE 1**  
**WETLANDS SUMMARY**

Wetland ID	Location Notes	Preliminary Jurisdiction	Total Wetland within ROW (ac)	Proposed Direct Impacts (ac)*	Functional Assessment?	Onsite/Offsite Assessment <sup>A</sup>	Comments
<b>Caliente Alternative Segment</b>							
CC1	Indian Cove pasture	Jurisdictional	1.3000	0.3661	Yes	On	Indian Cove Staging Yard; Roadbed
CC2	Indian Cove pasture	Jurisdictional	0.0116	0.0040	Yes	On	Roadbed
CC3	Indian Cove pasture	Jurisdictional	0.0638	0.0045	Yes	On	Roadbed
CC4	Indian Cove pasture	Jurisdictional	0.2444	0.0240	Yes	On	Roadbed
CC4A	Indian Cove pasture	Jurisdictional	0.1242	n/a	Yes	On	Outside of 55-ft. roadbed footprint; no direct impacts
CC4B	Indian Cove pasture	Jurisdictional	0.0044	0.0006	Yes	On	Roadbed
CC5	Indian Cove pasture	Jurisdictional	0.1289	0.0249	Yes	On	Roadbed
CC6	Indian Cove pasture	Jurisdictional	0.0100	n/a	Yes	On	Roadbed; no proposed direct impacts
CC7	Indian Cove pasture	Jurisdictional	3.1741	1.0125	Yes	On	Indian Cove Staging Yard; Roadbed
CC8	Indian Cove pasture	Jurisdictional	0.0849	0.0005	Yes	On	Roadbed
CC9	Indian Cove pasture	Jurisdictional	1.5442	0.3949	Yes	On	Roadbed
CC10	Indian Cove	Jurisdictional	1.1347	0.4447	Yes	On	Roadbed
CC11	Indian Cove	Isolated/Non-Juris.	0.0200	0.0116	Yes	On	Roadbed
CC12	Indian Cove	Jurisdictional	0.5833	0.1624	Yes	On	Roadbed
CC13	Indian Cove	Jurisdictional	0.5321	0.1159	Yes	On	Roadbed
CC14	Indian Cove	Jurisdictional	0.4214	0.0806	Yes	On	Roadbed
CC15	S MV meadow	Jurisdictional	0.2229	0.0693	Yes	On	Roadbed
CC16	S MV meadow	Isolated/Non-Juris.	0.0320	0.0289	Yes	On	Roadbed
CC17	S MV meadow	Jurisdictional	3.3077	1.4659	Yes	On	Roadbed
CC18	S MV meadow	Jurisdictional	0.0769	0.0249	Yes	On	Roadbed
CC19	S MV meadow	Jurisdictional	0.3009	0.1004	Yes	On	Roadbed
CC20	S MV meadow	Jurisdictional	0.5513	0.1079	Yes	On	Roadbed
CC21	S MV meadow	Jurisdictional	5.0758	2.2204	Yes	On	Roadbed
CC22	S MV meadow	Isolated/Non-Juris.	0.1310	0.1310	Yes	On	Roadbed
CC23	N MV meadow	Isolated/Non-Juris.	n/a	n/a	Yes	On	Outside of 100 ft. Roadbed ROW; unlikely impacts
CC24	N MV meadow	Jurisdictional	0.1690	0.0016	Yes	On	North Quarry Siding; Roadbed
CC25	N MV meadow	Jurisdictional	1.1279	0.1302	Yes	On	Roadbed
CC26	N MV meadow	Jurisdictional	0.4689	0.1872	Yes	On	North Quarry Siding; Roadbed
PWT-1	MVW adjacent	Jurisdictional	n/a	n/a	No	n/a	Adjacent; no direct, unlikely indirect impacts
PWT-2	MVW adjacent	Jurisdictional	0.2859	n/a	Yes	Off	Adjacent; no proposed direct impacts
WT-1	MVW adjacent	Jurisdictional	0.5395	n/a	Yes	Off	Adjacent and bridging incised channel
WT-2	Bennett Springs Wash	Jurisdictional	0.0662	n/a	Yes	Off	Bridging incised channel
WT-3	Upland Yard area	Isolated/Non-Juris.	0.3070	n/a	No	n/a	No proposed direct impacts; unlikely indirect impacts
WT-4	MVW adjacent	Jurisdictional	0.2357	n/a	Yes	Off	Adjacent; no proposed direct impacts
WT-5	MVW/Clover Creek	Jurisdictional	1.3647	n/a	Yes	On	Adjacent and bridging incised channel
WT-6	Antelope Canyon Wash	Jurisdictional	0.1557	n/a	Yes	On	Adjacent; no proposed direct impacts
--	--	<b>Total Acres:</b>	<b>23.80</b>	<b>7.11</b>	--	--	--
--	<b>Total Acres Assumed Jurisdictional:</b>		<b>23.31</b>	<b>6.94</b>	--	--	--
<b>Eccles Alternative Segment</b>							
WT-7	Clover Creek	Jurisdictional	n/a	n/a	No	n/a	No proposed direct impacts; unlikely indirect impacts
WT-8	Clover Creek/Railroad	Isolated/Non-Juris.	n/a	n/a	No	n/a	No proposed direct impacts; unlikely indirect impacts

**TABLE 1  
WETLANDS SUMMARY**

Wetland ID	Location Notes	Preliminary Jurisdiction	Total Wetland within ROW (ac)	Proposed Direct Impacts (ac)*	Functional Assessment?	Onsite/Offsite Assessment^	Comments
WT-9	Clover Creek	Jurisdictional	n/a	n/a	Yes	On	Potential indirect impacts only
WT-10	Clover Creek	Jurisdictional	n/a	n/a	Yes	On	Potential indirect impacts only
WT-11	Clover Creek	Jurisdictional	n/a	n/a	No	n/a	No proposed direct impacts; unlikely indirect impacts
--	--	<b>Total Acres:</b>	<b>0.00</b>	<b>0.00</b>	--	--	--
<b>Mina Implementing Alternative</b>							
WRN-1	Walker River	Jurisdictional	0.0045	0.0000	Yes	Off	WRN-1 will be bridged; potential very small impact
WRN-2	Walker River	Jurisdictional	0.0015	0.0000	Yes	Off	WRN-2 will be bridged; potential very small impact
WRN-3	Walker River	Jurisdictional	0.0000	0.0000	Yes	Off	Potential indirect impacts only
WRN-4	Walker River	Jurisdictional	0.0000	0.0000	Yes	Off	Potential indirect impacts only
--	--	<b>Total Acres:</b>	<b>0.0060</b>	<b>0.00</b>	--	--	--

Notes

1. \*Assumes direct (fill) impacts within 55-ft. roadbed footprint, minus adjacent or bridged wetlands assumed to be avoided.
2. ^Onsite means assessed for functional capacity by direct field observation. Offsite means assessed for functional capacity by remote sensing methods.
3. Direct impact estimates assume that wetlands to be bridged will be fully avoided due to incised washes and bridge design.
4. Wetlands that are noted as "adjacent" are adjacent to old roadbed, and assumed to be avoided outside of the proposed 55-ft.-wide roadbed footprint.

Abbreviations

MV - Meadow Valley  
 MVW - Meadow Valley Wash  
 N - North  
 S - South

**TABLE 2  
WETLANDS FUNCTION ASSESSMENT SUMMARY**

Wetland Assessment Unit	Wetland (s) Included within AU	Cowardin Class	HGM Classification	Water Storage and Delay	Sediment Stabilization/Phosphorus Retention	Nitrogen Removal	Primary Production	Thermoregulation	Resident Fish Habitat Support	Invertebrate Habitat Support	Amphibian and Turtle Habitat	Breeding Waterbird Support	Wintering and Migratory Waterbird Support	Songbird Habitat Support	Support of Characteristic Vegetation
<b>Caliente Alternative Segment</b>															
AU-1	WT-5, WT-6	PFO	Riverine Flow-through	0.6	0.5	0.5	0.6	0.6	0.5	0.4	0.3	0.3	0.5	0.6	0.5
AU-2	CC: 1, 7, 9, 10, 13, 17 (portion), 19, 20, 21 (majority of), 24, 25, 26	PEM	Slope	0.5	0.4	0.5	0.4	N/A	N/A	0.3	0.4	0.4	0.4	0.4	0.3
AU-3	CC: 17 (portion); PWT: 1, 2; WT: 1, 2, 3, 4	PEM	Riverine Flow-through	0.3	0.4	0.4	0.5	0.5	0.7	0.5	0.4	0.4	0.4	0.6	0.5
AU-4	CC: 2, 3, 4, 4A, 4B, 5, 6, 8, 14, 14A, 15, 16, 18, 23A	PEM	Slope	0.3	0.3	0.3	0.4	N/A	N/A	0.3	0.3	0.3	0.3	0.3	0.3
AU-5	CC: 12, 17 (Portion), 21 (Portion),	PEM	Depres-sional	0.7	0.5	0.6	0.5	N/A	N/A	0.5	0.5	0.5	0.5	0.5	0.5
<b>Eccles Alternative Segment</b>															
AU-6	WT-9, WT-10	PFO	Riverine Flow-through	0.2	0.3	0.2	0.4	0.3	0.5	0.4	0.4	0.4	0.5	0.6	0.6
<b>Mina Implementing Alternative</b>															
AU-7	WRN-1, WRN-4	PSS	Riverine Flow-through	0.4	0.5	0.3	0.5	0.4	0.4	0.5	0.5	0.4	0.5	0.6	0.6

**TABLE 3**  
**WETLAND IMPACTS SUMMARY TABLE – ACREAGE AND FUNCTIONS**

Alternative/Segment	Wetland AUs Directly Impacted in Order	Direct Wetland Impact Estimate (ac)	Potential Indirect Impacts	Primary Functions Affected (Directly and Indirectly, as Noted)
<b>Caliente Alternative Segment</b>				
Roadbed Construction	<ul style="list-style-type: none"> <li>Predominantly AU-2 but includes:<sup>1</sup> <ul style="list-style-type: none"> <li>AU-1</li> <li>AU-2</li> <li>AU-3</li> <li>AU-4</li> <li>AU-5</li> </ul> </li> </ul>	<p align="center">7.1  (6.9 ac. assumed jurisdictional)</p>	<ul style="list-style-type: none"> <li>(ST) Water Quality (BMPs to mitigate) <ul style="list-style-type: none"> <li>Mitigate with BMPs and suggested irrigation water timing (low/no flow).</li> <li>More manageable for AU-2 and AU-4 because less open water.</li> </ul> </li> <li>(ST) Wildlife habitat support - from construction activity and noise.</li> <li>(LT) Potential minor impact to Sediment Stabilization with new bridge/hydraulic design of bridge would mitigate.</li> </ul>	<ul style="list-style-type: none"> <li>(LT) Majority to pasture (Slope) wetlands thus: <ul style="list-style-type: none"> <li>Water Storage and Delay</li> <li>Nitrogen Removal</li> <li>Sediment and Phosphorus Retention</li> <li>Low-moderate wildlife and vegetation functions by lessening area</li> </ul> </li> <li>(ST, LT) AU-1 and AU-3 (RFT) – no to very minor direct bridge construction effects (e.g., pier placement), could minorly impact habitat functions such as fish, invertebrate and songbird support.</li> </ul>
Interchange Yard	N/A	0.0	N/A	N/A
Indian Cove Staging Yard	<ul style="list-style-type: none"> <li>AU-2 (47.0 ac)</li> </ul>	47.0	<ul style="list-style-type: none"> <li>(ST) Water Quality (BMPs to mitigate) <ul style="list-style-type: none"> <li>Mitigate with BMPs and suggested irrigation water timing (low/no flow).</li> </ul> </li> <li>(ST) Wildlife habitat support – from construction activity and noise.</li> </ul>	<ul style="list-style-type: none"> <li>(LT) Entirely pasture (Slope) wetlands thus: <ul style="list-style-type: none"> <li>Water Storage and Delay</li> <li>Nitrogen Removal</li> <li>Sediment and Phosphorus Retention</li> <li>Low-moderate wildlife and vegetation functions by lessening area</li> </ul> </li> </ul>
Upland Staging Yard	N/A	0.0	N/A	N/A
North Quarry Siding	<ul style="list-style-type: none"> <li>AU-2 (1.5 ac)</li> </ul>	1.5	<ul style="list-style-type: none"> <li>(ST) Water Quality (BMPs to mitigate) <ul style="list-style-type: none"> <li>Mitigate with BMPs and suggested irrigation water timing (low/no flow).</li> </ul> </li> <li>(ST) Wildlife habitat support – from construction activity and noise.</li> </ul>	<ul style="list-style-type: none"> <li>(LT) Entirely pasture (Slope) wetlands thus: <ul style="list-style-type: none"> <li>Water Storage and Delay</li> <li>Nitrogen Removal</li> <li>Sediment and Phosphorus Retention</li> <li>Low-moderate wildlife and vegetation functions by lessening area</li> </ul> </li> </ul>
<b>Eccles Alternative Segment</b>				
Roadbed Construction	N/A	0.0	<ul style="list-style-type: none"> <li>(ST) Water Quality (BMPs to mitigate) <ul style="list-style-type: none"> <li>Mitigate with BMPs and in-water work timing (low/no flow).</li> </ul> </li> <li>(LT) Potential minor impact to Sediment Stabilization with new bridge/hydraulic design of bridge would mitigate.</li> </ul>	<ul style="list-style-type: none"> <li>(ST, LT) No to very minor direct bridge construction effects (e.g., pier placement) at WT-1 (AU-3, a RFT wetland), could minorly impact habitat functions such as fish, invertebrate and songbird support.</li> </ul>



**TABLE 3**  
**WETLAND IMPACTS SUMMARY TABLE – ACREAGE AND FUNCTIONS**

Alternative/Segment	Wetland AUs Directly Impacted in Order	Direct Wetland Impact Estimate (ac)	Potential Indirect Impacts	Primary Functions Affected (Directly and Indirectly, as Noted)
Interchange Yard	N/A	0.0	<ul style="list-style-type: none"> <li>• (ST) Water Quality (BMPs to mitigate) <ul style="list-style-type: none"> <li>◦ Mitigate with BMPs and in-water work timing (low/no flow).</li> </ul> </li> <li>• (LT) Water Storage and Delay – could decrease from existing due to alteration to localized hydraulic conditions from fill in Clover Creek wash; would need modeling to quantify.</li> <li>• (LT) Sediment Stabilization – potential increase to flow velocity could increase erosion during high-flow events; would need modeling to quantify.</li> <li>• (LT) Primary Production and Invertebrate Support – may decrease due to potential for higher velocity flow; less conducive conditions for algae/plants.</li> </ul>	N/A
Staging Yard	N/A	0.0	N/A	N/A
<b>Mina Implementing Alternative</b>				
Roadbed Construction	• AU-7 <sup>2</sup>	0.0*	<ul style="list-style-type: none"> <li>• (LT) Potential minor impact to Sediment Stabilization with new bridge/hydraulic design of bridge would mitigate.</li> </ul>	<ul style="list-style-type: none"> <li>• (ST, LT) AU-7 (RFT) – no to very minor direct bridge construction effects (e.g., pier placement); could minorly impact habitat functions such as fish, invertebrate and songbird support.</li> </ul>

<sup>1</sup> Acreage by specific AU may be readily derived by GIS analysis; AU-2 acreage will be the highest proportion of 7.1 acre impacts.

<sup>2</sup> Conceptual design indicates that approximately 300 sq. ft. (0.007 acre) of wetland (WRN-1 and WRN-2) could be directly impacted by placement of bridge piers.

Abbreviations: (ST) = Short-term Impact during Construction; (LT) = Long-term Impact; WQ = Water Quality; RFT = Riverine Flow-through HGM wetland class;

**APPENDIX A:**

**WETLAND FUNCTION ASSESSMENT DATA SHEETS**

## ASSESSMENT OF FUNCTION CAPACITY: JUDGMENTAL METHOD

Date: 2/25/2008 Project/Site: Caliente Rail Segment, Between Town of Caliente &amp; Indian Cove

Plot #: \_\_\_\_\_ Investigators: NBH, MPW HGM Classification: RFT

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Water Storage and Delay</b>		
<ul style="list-style-type: none"> <li>Proportion of site inundated seasonally is large</li> <li>Flood marks, stunted plants, and/or distinctive assemblages of plant species</li> <li>Most of surface water in the seasonally inundated zone remains for a few days after each rain event, not less or more</li> </ul>	0.5  0.8	<ul style="list-style-type: none"> <li>None of site is inundated only seasonally</li> <li>Site always comprised of permanent water or high water table</li> <li>Water added from rain events empties quickly from all of the site, via outlets or percolation</li> </ul>
Function Capacity Score:	0.6	Beaver Ponds are currently providing this function but would be lost in a large storm
<b>Sediment Stabilization and Phosphorus Retention</b>		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> <li>Texture of substrate in the upper 12" of seasonal zone is clay, silty clay, sandy clay, clay loam, or native organic</li> <li>Herbs, shrubs, and/or vines together always occupy a large percent of ground cover in seasonal zone</li> <li>Shallow pools and puddles are present and well interspersed with herbaceous vegetation</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>Most of the site has complex microtopography</li> </ul>	0.6  0.5  0.8  0.3  0.5  0.4	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> <li>Upper 12" of substrate in seasonal zone is mostly sand or gravel</li> <li>All or nearly all of substrate in seasonal zone is unvegetated</li> <li>Shallow pools are absent at all times of the year</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>Extensive evidence of scour</li> <li>Substrate is uniformly flat, no microtopography</li> </ul>
Function Capacity Score:	0.5	
<b>Nitrogen Removal</b> (only proceed if moles or features indicating oxygen deficits in soils in part of the site)		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> <li>Some surface water or saturation remains year-round</li> <li>Surface water dispersed around the site so water flow paths and residence times are long</li> <li>Soil microbial processes are mature, suggested by dead wood, thick organic layer, many large-diameter trees</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>None of site constructed from upland</li> <li>Most of the site has complex microtopography</li> <li>Site is burned annually or biennially</li> </ul>	0.6  0.4  0.5  0.5  0.4  0	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> <li>No surface water or saturation remains year-round</li> <li>If seasonal flooding occurs, surface water is concentrated in one part of site (channel, pond) and doesn't remain for long</li> <li>Soil microbial processes not well developed, suggested by lack of dead wood, thick organic layer, many large-diameter trees</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>some erosion</li> <li>Most of the site has no noticeable microtopography</li> <li>Site has not been burned in recent years</li> </ul>
Function Capacity Score:	0.5	Lots of opportunity
<b>Primary Production</b>		
<ul style="list-style-type: none"> <li>All of site has vascular plants and/or water with algae</li> <li>A variety of plant forms is present in about equal proportions and is well-distributed</li> <li>Some shallow (&lt;3 ft) surface water remains year-round, and in summer is dispersed around the site</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>Site's contributing watershed contains no cropland, paved surface, buildings, or lawns</li> </ul>	0.8  0.7  0.5  0.5  0.5	<ul style="list-style-type: none"> <li>Much of site is devoid of vascular plants and/or algae</li> <li>Whatever plants are present are mainly of a single form</li> <li>The site is entirely dry during much of the year</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>The site's contributing watershed is almost entirely cropland, paved surface, buildings, and lawns</li> </ul>
Function Capacity Score:	0.6	pasture
<b>Thermoregulation</b> (only assess at riverine sites where part of the site is permanently inundated & connected to other water body)		
<ul style="list-style-type: none"> <li>Entire water surface in summer is shaded by closed tree canopy or topography</li> <li>Almost the entire site consists of water deeper than 6 ft</li> </ul>	0.6  0.6	<ul style="list-style-type: none"> <li>None of water is shaded by vegetation or topography</li> <li>All of water is shallower than 2 m during summer</li> <li>Very little of the site contains permanent water</li> <li>Water is never deeper than a few inches</li> </ul>
Function Capacity Score:	0.6	

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Resident Fish Habitat Support</b> (only assess if part of the site is permanently inundated and subclass is RI)		
<ul style="list-style-type: none"> <li>Permanent water is extensive</li> <li>Site is connected only briefly with channels</li> <li>Non-native fish species are absent</li> </ul>	0.8	<ul style="list-style-type: none"> <li>Permanent water is very limited</li> </ul>
<ul style="list-style-type: none"> <li>Shallow water area and proportion of site that is inundated only seasonally is large enough to support spawning</li> <li>Supports high densities of aquatic invertebrates</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Non-native species dominate the resident fish component, although some natives are present</li> </ul>
<ul style="list-style-type: none"> <li>Cover providing year-round shelter from predators is abundant</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Shorelines are steep, dropping sharply into water deeper than 6 ft</li> <li>Little or no seasonal zone is present</li> </ul>
<b>Function Capacity Score:</b>	0.5	Speckled Dace, Desert Sucker
<b>Anadromous Fish Habitat Support</b> (only assess if part of site is accessible to anadromous fish during seasonal inundation)		
<ul style="list-style-type: none"> <li>Floodwaters spill into site across a broad bank or wide, unobstructed mouth</li> <li>Floodwaters remain for more than a few days</li> <li>Non-native fish species are generally absent</li> <li>Substrates suitable for spawning or feeding are extensively present</li> <li>Cover that provides shelter from currents and predators is abundant, at least in seasonal zone</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> <li>Summertime temperature maxima do not exceed preferred range of anadromous fish</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Floodwaters enter most of the site entirely through a narrow channel, ditch, or pipe</li> <li>No surface water remains for more than a few days</li> <li>Non-native fish species predominate</li> <li>Substrates suitable for spawning or feeding are scarce or absent</li> <li>Cover that provides shelter from currents and predators is scarce or lacking from all parts of site</li> <li>Water is heavily contaminated, oxygen deficits</li> <li>Summertime temperature maxima exceed limits lethal to anadromous fish</li> </ul>
<b>Function Capacity Score:</b>		
<b>Invertebrate Habitat Support</b>		
<ul style="list-style-type: none"> <li>Surface water is permanent or nearly permanent</li> <li>All of water is shallower than 2 ft during May-Sept</li> </ul>	0.6	<ul style="list-style-type: none"> <li>Surface water is present only briefly (RI sites) or not at all (SF sites), OR</li> <li>Nearly all water remains deeper than 6 ft during May-Sept</li> </ul>
<ul style="list-style-type: none"> <li>Cover that supports algae and provides shelter from currents and predators is abundant in both seasonal and permanent zone</li> <li>Plant forms and species are highly diverse</li> <li>Vegetation is well-interspersed with pools</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Cover that supports algae and provides shelter from currents and predators is lacking</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.6	<ul style="list-style-type: none"> <li>Only one plant form is present, and species richness is low</li> </ul>
<ul style="list-style-type: none"> <li>Surrounding landscape contains large acreage of wetlands, including some with different water regime than site</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Vegetation and pools are in 2 separate areas</li> <li>Water is heavily contaminated, oxygen deficits</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR</li> <li>Site was entirely constructed from upland</li> <li>Surrounding landscape contains no wetlands or ponds</li> </ul>
<b>Function Capacity Score:</b>	0.4	
<b>Amphibian and Turtle Habitat</b>		
<ul style="list-style-type: none"> <li>Permanent water is absent, but shallow surface water with partly-submerged fine-stemmed herbs is extensive, and recedes very gradually during Jan-May (at least 30 days when water levels fluctuate &lt;2 inches), OR</li> <li>Permanent water is extensive and contains abundant underwater cover and partly-submerged fine-stemmed herbs</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Site never contains surface water, OR</li> <li>Site is entirely surface water, which either never fluctuates vertically (no seasonal zone present), or fluctuates too much (&gt;2 inches during all 10-day periods), or is devoid of any emergent herbs that are partly-submerged during springtime, or flows faster than 4"/sec during the entire spring, everywhere, or is mostly deeper than 40" and is bordered by shoreline with very steep slope</li> </ul>
<ul style="list-style-type: none"> <li>Bullfrogs and other non-native predators are absent</li> </ul>	0	<ul style="list-style-type: none"> <li>Bullfrogs and other non-native predators are abundant</li> </ul>
<ul style="list-style-type: none"> <li>If surface water everywhere in the site is flowing during springtime, there are at least 30 days when current velocities are &lt;4"/sec</li> </ul>	0.4	<ul style="list-style-type: none"> <li>If surface water everywhere in the site is flowing during springtime, there are never more than 30 days when current velocities are &lt;4"/sec</li> </ul>
<ul style="list-style-type: none"> <li>Extensive and varied woody debris in seasonal zone</li> </ul>	0.5	<ul style="list-style-type: none"> <li>No woody debris in seasonal zone</li> </ul>
<ul style="list-style-type: none"> <li>Either vegetation and pools are well-interspersed during high water level, or woody vegetation bordering the larger pools is located mostly on the north end</li> <li>Microtopography is quite varied</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Vegetation and pools are in separate areas of the site during high water level, and any woody vegetation bordering the larger pools is located mostly on their south end</li> <li>Microtopography is too flat to form puddles</li> </ul>

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
• Suitable basking sites for turtles and calling sites for frogs are present	0.3	• There are no basking sites for turtles or calling sites for frogs
• Land cover in adjoining uplands is a mix of natural grassland and woodland w/ extensive woody debris	0.2	• Land cover in adjoining uplands contains impervious surface, bare ground, lawns, and row crops <i>Residential &amp; Pastoral</i>
• Shorelines are gently sloping	0.1	• Shorelines are mostly steep
• Busy roads are distant from the site	0.2	• Busy roads adjoin the site
• Many other wetlands are present nearby	0.4	• There are no other wetlands nearby
• Water quality is excellent	0.3	• Water is heavily contaminated, oxygen deficits
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.5	• Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR
• No evidence of severe erosion		• Site was entirely constructed from upland
• Soils and submerged sediments contain a moderately thick organic layer (leaf litter, peat, decomposed organics, etc.)	0.5	• Soils and submerged sediments contain no organic layer, and are mostly hard-packed clay, OR
		• Organic layer is so thick that water is chronically anoxic
Function Capacity Score:		0.3
<b>Breeding Waterbird Support</b>		
• The site contains many acres of (nearly) permanent surface water, or a large permanent wetland is located nearby, AND	0.3	• Surface water is present for only a few weeks during Apr-June, OR
• Water depths are shallow (2-24 inches) in Apr-Aug		• Nearly all water remains deeper than 6 ft during May-Sept, AND
• Most of the shoreline is not steep	0.1	• No permanent wetlands are located nearby
• Larger pools of water are bordered by wide, dense band of tall herbs/shrubs during Apr-Aug	0.5	• Most of the shoreline is steep
• About equal proportions of water and vegetation are present, and are well-interspersed during Apr-Aug	0.5	• Larger pools are bordered by only a narrow band of sparse vegetation
• Water levels do not abruptly rise a foot or more during Apr-June	0.1	• Vegetation and pools are in 2 separate areas or zones, not interspersed
• A large variety of herbs is present		• Water levels are prone to quickly rise at least 1 foot during Apr-June
• Site is actively managed to control spread of non-native or invasive species	0.3	• Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, and water	0.5	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• Busy roads are distant from the site	0.2	• Busy roads border the site
• Water quality is excellent	0.3	• Water is heavily contaminated with pollutants
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.5	• Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled,
• Surrounding landscape contains large acreage of wetlands, including some with different water regime than site	0.4	• Surrounding landscape contains no wetlands or ponds
• Nest boxes, nest platforms, and other artificial structures are extensive and regularly maintained	0	• No nest boxes, nest platforms, or other artificial structures are present, or aren't well-maintained
• None of the site is visited frequently by humans on foot in April-June	0.8	• All of the site is visited frequently by humans on foot during April-June
Function Capacity Score:		0.3
<b>Wintering and Migratory Waterbird Support</b>		
• The site contains extensive surface water during all or most of the fall-winter-spring period	0.8	• The site contains very little surface water during all or most of the fall-winter-spring period
• Water depths during most of the fall-winter-spring period are shallow (<24 inches)	0.3	• If forested, water depths during the fall-winter-spring period are always shallower than 24"
• A large portion of the site is inundated only seasonally	0.3	• Of the water that is present, nearly all is present year-round
• The acreage of various depth categories is about equal during peak annual inundation	0.3	• A single water depth category predominates
• Microtopographic variation is extensive	0.4	• The substrate is flat, prohibiting puddle formation
• None of the site is visited frequently by humans on foot during September-Apr	0.8	• All of the site is visited frequently by humans on foot during September-April
• A large variety of herbs is present		• Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species
• Site is actively managed to control the spread of non-native or invasive species	0.3	
• Water quality is excellent	0.3	• Water is heavily contaminated with pollutants



HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.5	• Substrates have recently been recontoured, compacted, excavated, plowed, disked or leveled, <i>via fluvial processes</i>
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water	0.6	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• Surrounding landscape contains large acreage of hydric soil, wetlands, and water, including some with a different water regime	0.4	• Surrounding landscape contains no wetlands, ponds, or hydric soil
<b>Function Capacity Score:</b>	0.5	
<b>Songbird Habitat Support</b>		
• Some part of the site contains surface water during all of the year	0.8	• Surface water is never present at any time of the year
• The site contains a large acreage of closed-canopy forest, native shrubland, wet prairie, and/or emergent wetland	0.5	• Acreage of these is very small
• If the site is mostly native shrubland and/or forest then large-diameter trees, snags, and undercanopy shrub cover are extensive, and a large variety of trees, shrubs, and vines is present	0.8	• If the site is mostly shrubland and/or forest, then trees are small, snags are absent, under-canopy shrub cover is lacking, and the variety of trees, shrubs, and vines is small and comprised of non-native species
• If the site is mostly wet prairie and/or emergent wetland, then a large variety of herbs is present, the site is actively managed to control the spread of non-native or invasive herb species, and trees and shrubs are concentrated in one part of the site	0.5	• If the site is mostly prairie and/or emergent wetland, then the variety of herbs is small, the site is not actively managed, and trees and shrubs are scattered widely throughout the site
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water	0.5	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• None of the site is visited frequently by humans on foot in April through June	0.8	• Every part of the site is visited frequently by humans on foot in April through June
• Busy roads are distant from the site	0.2	• Busy roads adjoin the site
<b>Function Capacity Score:</b>	0.6	
<b>Support of Characteristic Vegetation</b>		
• Trees, shrubs, and herbs are all present, and are well-interspersed throughout the site	0.7	• Only one plant form is present
• If trees are present, many are very old and large, with abundant evidence of regeneration	0.6	• If trees are present, all are young
• If shrubs are present, all of the significantly present shrub species are natives	0.8	• If shrubs are present, they are comprised of just one species, and it is non-native
• If herbs are present, all of the significantly present herb species are natives	0.6	• If herbs are present, they are comprised of just one species, and it is non-native
• Microtopographic relief is great	0.2	• The substrate is flat, prohibiting puddle formation
• Springtime surface water levels drop very slowly (<2 vertical inches per 30 days, average)	0.3	• Springtime water levels fluctuate or drop rapidly (>2 inches per 10 days, average)
• None of the site is visited frequently by humans on foot in September through April	0.8	• Every part of the site is visited frequently by humans on foot in September through April
• Busy roads are distant from the site	0.2	• Busy roads adjoin the site
• Land cover in the contributing watershed is predominantly "natural"	0.6	• Land cover in the contributing watershed largely contains impervious surface, bare ground, lawns, and row crops
• Land cover in surrounding buffer zones is predominantly a mix of natural grassland, native shrubland, woodland, wetlands, and water	0.5	• Land cover in surrounding buffer largely contains impervious surface, bare ground, lawns, and row crops
• Water quality is excellent	0.3	• Water is heavily contaminated with pollutants
<b>Function Capacity Score:</b>	0.5	

## ASSESSMENT OF FUNCTION CAPACITY: JUDGMENTAL METHOD

Date: 2/25/08 Project/Site: Caliente Rail - Degraded Cow pasture - Spring fed w/ supplemental irrigationPlot #: - Investigators: NBH & MPW HGM Classification: Slope

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Water Storage and Delay</b>		
<ul style="list-style-type: none"> <li>Proportion of site inundated seasonally is large</li> <li>Flood marks, stunted plants, and/or distinctive assemblages of plant species</li> <li>Most of surface water in the seasonally inundated zone remains for a few days after each rain event, not less or more</li> </ul>	0.6	<ul style="list-style-type: none"> <li>None of site is inundated only seasonally</li> <li>Site always comprised of permanent water or high water table</li> <li>Water added from rain events empties quickly from all of the site, via outlets or percolation</li> </ul>
Function Capacity Score:	0.5	irrigated + contains springs
<b>Sediment Stabilization and Phosphorus Retention</b>		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> <li>Texture of substrate in the upper 12" of seasonal zone is clay, silty clay, sandy clay, clay loam, or native organic</li> <li>Herbs, shrubs, and/or vines together always occupy a large percent of ground cover in seasonal zone</li> <li>Shallow pools and puddles are present and well interspersed with herbaceous vegetation <i>springs</i></li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> <li>Upper 12" of substrate in seasonal zone is mostly sand or gravel - silt loam</li> <li>All or nearly all of substrate in seasonal zone is unvegetated</li> <li>Shallow pools are absent at all times of the year</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>Extensive evidence of scour</li> <li>Substrate is uniformly flat, no microtopography</li> </ul>
Function Capacity Score:	0.4	Low score reflects grazed vegetation w- little "trapping" ability
<b>Nitrogen Removal</b> (only proceed if monitors or features indicating oxygen deficits in soils in part of the site)		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> <li>Some surface water or saturation remains year-round</li> <li>Surface water dispersed around the site so water flow paths and residence times are long</li> <li>Soil microbial processes are mature, suggested by dead wood, thick organic layer, many large-diameter trees</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>None of site constructed from upland</li> <li>Most of the site has complex microtopography</li> <li>Site is burned annually or biennially</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> <li>No surface water or saturation remains year-round</li> <li>If seasonal flooding occurs, surface water is concentrated in one part of site (channel, pond) and doesn't remain for long</li> <li>Soil microbial processes not well developed, suggested by lack of dead wood, thick organic layer, many large-diameter trees</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>Most of the site has no noticeable microtopography</li> <li>Site has not been burned in recent years</li> </ul>
Function Capacity Score:	0.5	high opportunity
<b>Primary Production</b>		
<ul style="list-style-type: none"> <li>All of site has vascular plants and/or water with algae</li> <li>A variety of plant forms is present in about equal proportions and is well-distributed</li> <li>Some shallow (&lt;3 ft) surface water remains year-round, and in summer is dispersed around the site</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>Site's contributing watershed contains no cropland, paved surface, buildings, or lawns</li> </ul>	0.8	<ul style="list-style-type: none"> <li>Much of site is devoid of vascular plants and/or algae</li> <li>Whatever plants are present are mainly of a single form</li> <li>The site is entirely dry during much of the year</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>The site's contributing watershed is almost entirely cropland, paved surface, buildings, and lawns</li> </ul>
Function Capacity Score:	0.4	
<b>Thermoregulation</b> (only assess at riverine sites where part of the site is permanently inundated & connected to other water body)		
<ul style="list-style-type: none"> <li>Entire water surface in summer is shaded by closed tree canopy or topography</li> <li>Almost the entire site consists of water deeper than 6 ft</li> </ul>	N/A	<ul style="list-style-type: none"> <li>None of water is shaded by vegetation or topography</li> <li>All of water is shallower than 2 m during summer</li> <li>Very little of the site contains permanent water</li> <li>Water is never deeper than a few inches</li> </ul>
Function Capacity Score:		

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Resident Fish Habitat Support</b> (only assess if part of the site is permanently inundated and subclass is RI)		
<ul style="list-style-type: none"> <li>Permanent water is extensive</li> <li>Site is connected only briefly with channels</li> <li>Non-native fish species are absent</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Permanent water is very limited</li> <li>Non-native species dominate the resident fish component, although some natives are present</li> <li>Shorelines are steep, dropping sharply into water deeper than 6 ft</li> <li>Little or no seasonal zone is present</li> </ul>
<ul style="list-style-type: none"> <li>Shallow water area and proportion of site that is inundated only seasonally is large enough to support spawning</li> <li>Supports high densities of aquatic invertebrates</li> <li>Cover providing year-round shelter from predators is abundant</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> </ul>		<ul style="list-style-type: none"> <li>Cover is scarce or lacking where water is present seasonally</li> <li>Water is heavily contaminated, oxygen deficits</li> </ul>
<b>Function Capacity Score:</b>		
<b>Anadromous Fish Habitat Support</b> (only assess if part of site is accessible to anadromous fish during seasonal inundation)		
<ul style="list-style-type: none"> <li>Floodwaters spill into site across a broad bank or wide, unobstructed mouth</li> <li>Floodwaters remain for more than a few days</li> <li>Non-native fish species are generally absent</li> <li>Substrates suitable for spawning or feeding are extensively present</li> <li>Cover that provides shelter from currents and predators is abundant, at least in seasonal zone</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> <li>Summertime temperature maxima do not exceed preferred range of anadromous fish</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Floodwaters enter most of the site entirely through a narrow channel, ditch, or pipe</li> <li>No surface water remains for more than a few days</li> <li>Non-native fish species predominate</li> <li>Substrates suitable for spawning or feeding are scarce or absent</li> <li>Cover that provides shelter from currents and predators is scarce or lacking from all parts of site</li> <li>Water is heavily contaminated, oxygen deficits</li> <li>Summertime temperature maxima exceed limits lethal to anadromous fish</li> </ul>
<b>Function Capacity Score:</b>		
<b>Invertebrate Habitat Support</b>		
<ul style="list-style-type: none"> <li>Surface water is permanent or nearly permanent</li> <li>All of water is shallower than 2 ft during May-Sept</li> </ul>	0.8	<ul style="list-style-type: none"> <li>Surface water is present only briefly (RI sites) or not at all (SF sites), OR</li> <li>Nearly all water remains deeper than 6 ft during May-Sept</li> </ul>
<ul style="list-style-type: none"> <li>Cover that supports algae and provides shelter from currents and predators is abundant in both seasonal and permanent zone</li> <li>Plant forms and species are highly diverse</li> </ul>	0.1	<ul style="list-style-type: none"> <li>Cover that supports algae and provides shelter from currents and predators is lacking</li> <li>Only one plant form is present, and species richness is low</li> </ul>
<ul style="list-style-type: none"> <li>Vegetation is well-interspersed with pools</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Vegetation and pools are in 2 separate areas</li> <li>Water is heavily contaminated, oxygen deficits</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR</li> <li>Site was entirely constructed from upland</li> </ul>
<ul style="list-style-type: none"> <li>Surrounding landscape contains large acreage of wetlands, including some with different water regime than site</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Surrounding landscape contains no wetlands or ponds</li> </ul>
<b>Function Capacity Score:</b>		
<b>Amphibian and Turtle Habitat</b>		
<ul style="list-style-type: none"> <li>Permanent water is absent, but shallow surface water with partly-submerged fine-stemmed herbs is extensive, and recedes very gradually during Jan-May (at least 30 days when water levels fluctuate &lt;2 inches), OR</li> <li>Permanent water is extensive and contains abundant underwater cover and partly-submerged fine-stemmed herbs</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Site never contains surface water, OR</li> <li>Site is entirely surface water, which either never fluctuates vertically (no seasonal zone present), or fluctuates too much (&gt;2 inches during all 10-day periods), or is devoid of any emergent herbs that are partly-submerged during springtime, or flows faster than 4"/sec during the entire spring, everywhere, or is mostly deeper than 40" and is bordered by shoreline with very steep slope</li> </ul>
<ul style="list-style-type: none"> <li>Bullfrogs and other non-native predators are absent</li> </ul>	0.1	<ul style="list-style-type: none"> <li>Bullfrogs and other non-native predators are abundant</li> </ul>
<ul style="list-style-type: none"> <li>If surface water everywhere in the site is flowing during springtime, there are at least 30 days when current velocities are &lt;4"/sec</li> </ul>	0.8	<ul style="list-style-type: none"> <li>If surface water everywhere in the site is flowing during springtime, there are never more than 30 days when current velocities are &lt;4"/sec</li> </ul>
<ul style="list-style-type: none"> <li>Extensive and varied woody debris in seasonal zone</li> </ul>	0.1	<ul style="list-style-type: none"> <li>No woody debris in seasonal zone</li> </ul>
<ul style="list-style-type: none"> <li>Either vegetation and pools are well-interspersed during high water level, or woody vegetation bordering the larger pools is located mostly on the north end</li> <li>Microtopography is quite varied</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Vegetation and pools are in separate areas of the site during high water level, and any woody vegetation bordering the larger pools is located mostly on their south end.</li> <li>Microtopography is too flat to form puddles</li> </ul>

Relatively large for NN - see AU-3 & AU-5  
 Primarily in Spring areas where inundation is stagnant & semi-permanent



HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<ul style="list-style-type: none"> <li>Suitable basking sites for turtles and calling sites for frogs are present</li> </ul>	0.3	<ul style="list-style-type: none"> <li>There are no basking sites for turtles or calling sites for frogs</li> </ul>
<ul style="list-style-type: none"> <li>Land cover in adjoining uplands is a mix of natural grassland and woodland w/ extensive woody debris</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Land cover in adjoining uplands contains impervious surface, bare ground, lawns, and row crops</li> </ul>
<ul style="list-style-type: none"> <li>Shorelines are gently sloping</li> </ul>	0.8	<ul style="list-style-type: none"> <li>Shorelines are mostly steep around springs</li> </ul>
<ul style="list-style-type: none"> <li>Busy roads are distant from the site</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Busy roads adjoin the site</li> </ul>
<ul style="list-style-type: none"> <li>Many other wetlands are present nearby</li> </ul>	0.5	<ul style="list-style-type: none"> <li>There are no other wetlands nearby</li> </ul>
<ul style="list-style-type: none"> <li>Water quality is excellent</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Water is heavily contaminated, oxygen deficits</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR</li> </ul>
<ul style="list-style-type: none"> <li>No evidence of severe erosion</li> </ul>		<ul style="list-style-type: none"> <li>Site was entirely constructed from upland</li> </ul>
<ul style="list-style-type: none"> <li>Soils and submerged sediments contain a moderately thick organic layer (leaf litter, peat, decomposed organics, etc.)</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Soils and submerged sediments contain no organic layer, and are mostly hard-packed clay, OR</li> </ul>
		<ul style="list-style-type: none"> <li>Organic layer is so thick that water is chronically anoxic ↑ 0/0 manure</li> </ul>
Function Capacity Score:	0.4	marginal amphib. habitat near spring
<b>Breeding Waterbird Support</b>		
<ul style="list-style-type: none"> <li>The site contains many acres of (nearly) permanent surface water, or a large permanent wetland is located nearby, AND</li> <li>Water depths are shallow (2-24 inches) in Apr-Aug</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Surface water is present for only a few weeks during Apr-June, OR</li> <li>Nearly all water remains deeper than 6 ft during May-Sept, AND</li> <li>No permanent wetlands are located nearby</li> </ul>
<ul style="list-style-type: none"> <li>Most of the shoreline is not steep</li> </ul>	0.8	<ul style="list-style-type: none"> <li>Most of the shoreline is steep</li> </ul>
<ul style="list-style-type: none"> <li>Larger pools of water are bordered by wide, dense band of tall herbs/shrubs during Apr-Aug</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Larger pools are bordered by only a narrow band of sparse vegetation</li> </ul>
<ul style="list-style-type: none"> <li>About equal proportions of water and vegetation are present, and are well-interspersed during Apr-Aug</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Vegetation and pools are in 2 separate areas or zones, not interspersed</li> </ul>
<ul style="list-style-type: none"> <li>Water levels do not abruptly rise a foot or more during Apr-June</li> </ul>	0.8	<ul style="list-style-type: none"> <li>Water levels are prone to quickly rise at least 1 foot during Apr-June</li> </ul>
<ul style="list-style-type: none"> <li>A large variety of herbs is present</li> <li>Site is actively managed to control spread of non-native or invasive species</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species</li> </ul>
<ul style="list-style-type: none"> <li>Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, and water</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops</li> </ul>
<ul style="list-style-type: none"> <li>Busy roads are distant from the site</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Busy roads border the site</li> </ul>
<ul style="list-style-type: none"> <li>Water quality is excellent</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Water is heavily contaminated with pollutants</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled,</li> </ul>
<ul style="list-style-type: none"> <li>Surrounding landscape contains large acreage of wetlands, including some with different water regime than site</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Surrounding landscape contains no wetlands or ponds</li> </ul>
<ul style="list-style-type: none"> <li>Nest boxes, nest platforms, and other artificial structures are extensive and regularly maintained</li> </ul>	0.1	<ul style="list-style-type: none"> <li>No nest boxes, nest platforms, or other artificial structures are present, or aren't well-maintained</li> </ul>
<ul style="list-style-type: none"> <li>None of the site is visited frequently by humans on foot in April-June</li> </ul>	0.3	<ul style="list-style-type: none"> <li>All of the site is visited frequently by humans on foot during April-June</li> </ul>
Function Capacity Score:	0.4	mostly foraging support - breeding would occur in AU-5
<b>Wintering and Migratory Waterbird Support</b>		
<ul style="list-style-type: none"> <li>The site contains extensive surface water during all or most of the fall-winter-spring period</li> </ul>	0.3	<ul style="list-style-type: none"> <li>The site contains very little surface water during all or most of the fall-winter-spring period</li> </ul>
<ul style="list-style-type: none"> <li>Water depths during most of the fall-winter-spring period are shallow (&lt;24 inches)</li> </ul>	0.6	<ul style="list-style-type: none"> <li>If forested, water depths during the fall-winter-spring period are always shallower than 24"</li> </ul>
<ul style="list-style-type: none"> <li>A large portion of the site is inundated only seasonally</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Of the water that is present, nearly all is present year-round</li> </ul>
<ul style="list-style-type: none"> <li>The acreage of various depth categories is about equal during peak annual inundation</li> </ul>	0.3	<ul style="list-style-type: none"> <li>A single water depth category predominates</li> </ul>
<ul style="list-style-type: none"> <li>Microtopographic variation is extensive</li> </ul>	0.3	<ul style="list-style-type: none"> <li>The substrate is flat, prohibiting puddle formation</li> </ul>
<ul style="list-style-type: none"> <li>None of the site is visited frequently by humans on foot during September-Apr</li> </ul>	0.3	<ul style="list-style-type: none"> <li>All of the site is visited frequently by humans on foot during September-April</li> </ul>
<ul style="list-style-type: none"> <li>A large variety of herbs is present</li> <li>Site is actively managed to control the spread of non-native or invasive species</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species</li> </ul>
<ul style="list-style-type: none"> <li>Water quality is excellent</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Water is heavily contaminated with pollutants</li> </ul>

fed seasonal pools

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Substrates have recently been recontoured, compacted, excavated, plowed, disked or leveled,</li> </ul>
<ul style="list-style-type: none"> <li>Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops</li> </ul>
<ul style="list-style-type: none"> <li>Surrounding landscape contains large acreage of hydric soil, wetlands, and water, including some with a different water regime</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Surrounding landscape contains no wetlands, ponds, or hydric soil</li> </ul>
Function Capacity Score:		0.4 Ducks & Geese observed
<b>Songbird Habitat Support</b>		
<ul style="list-style-type: none"> <li>Some part of the site contains surface water during all of the year</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Surface water is never present at any time of the year</li> </ul>
<ul style="list-style-type: none"> <li>The site contains a large acreage of closed-canopy forest, native shrubland, wet prairie, and/or emergent wetland</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Acreage of these is very small</li> </ul>
<ul style="list-style-type: none"> <li>If the site is mostly native shrubland and/or forest then large-diameter trees, snags, and undercanopy shrub cover are extensive, and a large variety of trees, shrubs, and vines is present</li> </ul>	N/A	<ul style="list-style-type: none"> <li>If the site is mostly shrubland and/or forest, then trees are small, snags are absent, under-canopy shrub cover is lacking, and the variety of trees, shrubs, and vines is small and comprised of non-native species</li> </ul>
<ul style="list-style-type: none"> <li>If the site is mostly wet prairie and/or emergent wetland, then a large variety of herbs is present, the site is actively managed to control the spread of non-native or invasive herb species, and trees and shrubs are concentrated in one part of the site</li> </ul>	0.2	<ul style="list-style-type: none"> <li>If the site is mostly prairie and/or emergent wetland, then the variety of herbs is small, the site is not actively managed, and trees and shrubs are scattered widely throughout the site</li> </ul>
<ul style="list-style-type: none"> <li>Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops</li> </ul>
<ul style="list-style-type: none"> <li>None of the site is visited frequently by humans on foot in April through June</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Every part of the site is visited frequently by humans on foot in April through June</li> </ul>
<ul style="list-style-type: none"> <li>Busy roads are distant from the site</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Busy roads adjoin the site</li> </ul>
Function Capacity Score:		0.4 thrushes observed
<b>Support of Characteristic Vegetation</b>		
<ul style="list-style-type: none"> <li>Trees, shrubs, and herbs are all present, and are well-interspersed throughout the site</li> </ul>	0.1	<ul style="list-style-type: none"> <li>Only one plant form is present</li> </ul>
<ul style="list-style-type: none"> <li>If trees are present, many are very old and large, with abundant evidence of regeneration</li> </ul>	N/A	<ul style="list-style-type: none"> <li>If trees are present, all are young</li> </ul>
<ul style="list-style-type: none"> <li>If shrubs are present, all of the significantly present shrub species are natives</li> </ul>	N/A	<ul style="list-style-type: none"> <li>If shrubs are present, they are comprised of just one species, and it is non-native</li> </ul>
<ul style="list-style-type: none"> <li>If herbs are present, all of the significantly present herb species are natives</li> </ul>	0.1	<ul style="list-style-type: none"> <li>If herbs are present, they are comprised of just one species, and it is non-native</li> </ul>
<ul style="list-style-type: none"> <li>Microtopographic relief is great</li> </ul>	0.3	<ul style="list-style-type: none"> <li>The substrate is flat, prohibiting puddle formation</li> </ul>
<ul style="list-style-type: none"> <li>Springtime surface water levels drop very slowly (&lt;2 vertical inches per 30 days, average)</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Springtime water levels fluctuate or drop rapidly (&gt;2 inches per 10 days, average)</li> </ul>
<ul style="list-style-type: none"> <li>None of the site is visited frequently by humans on foot in September through April</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Every part of the site is visited frequently by humans on foot in September through April</li> </ul>
<ul style="list-style-type: none"> <li>Busy roads are distant from the site</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Busy roads adjoin the site</li> </ul>
<ul style="list-style-type: none"> <li>Land cover in the contributing watershed is predominantly "natural"</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Land cover in the contributing watershed largely contains impervious surface, bare ground, lawns, and row crops</li> </ul>
<ul style="list-style-type: none"> <li>Land cover in surrounding buffer zones is predominantly a mix of natural grassland, native shrubland, woodland, wetlands, and water</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Land cover in surrounding buffer largely contains impervious surface, bare ground, lawns, and row crops</li> </ul>
<ul style="list-style-type: none"> <li>Water quality is excellent</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Water is heavily contaminated with pollutants</li> </ul>
Function Capacity Score:		0.3 Grazed pasture grasses

## ASSESSMENT OF FUNCTION CAPACITY: JUDGMENTAL METHOD

Date: 2/26/2008 Project/Site: Caliente Rail Segment - Active floodplain wetlands - non pasturePlot #: \_\_\_\_\_ Investigators: NBH, MPW HGM Classification: RFT

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Water Storage and Delay</b>		
<ul style="list-style-type: none"> <li>Proportion of site inundated seasonally is large</li> <li>Flood marks, stunted plants, and/or distinctive assemblages of plant species</li> <li>Most of surface water in the seasonally inundated zone remains for a few days after each rain event, not less or more</li> </ul>	0.8 0.2	<ul style="list-style-type: none"> <li>None of site is inundated only seasonally</li> <li>Site always comprised of permanent water or high water table</li> <li>Water added from rain events empties quickly from all of the site, via outlets or percolation</li> </ul>
Function Capacity Score:	0.3	RFT typically provides little storage or delay - no beaver ponds in comparison with AU-1
<b>Sediment Stabilization and Phosphorus Retention</b>		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> <li>Texture of substrate in the upper 12" of seasonal zone is clay, silty clay, sandy clay, clay loam, or native organic</li> <li>Herbs, shrubs, and/or vines together always occupy a large percent of ground cover in seasonal zone</li> <li>Shallow pools and puddles are present and well interspersed with herbaceous vegetation</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.3 0.5 0.5 0.1 0.3	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> <li>Upper 12" of substrate in seasonal zone is mostly sand or gravel</li> <li>All or nearly all of substrate in seasonal zone is unvegetated</li> <li>Shallow pools are absent at all times of the year</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>Extensive evidence of scour</li> <li>Substrate is uniformly flat, no microtopography</li> </ul>
Function Capacity Score:	0.4	
<b>Nitrogen Removal</b> (only proceed if mottles or features indicating oxygen deficits in soils in part of the site)		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> <li>Some surface water or saturation remains year-round</li> <li>Surface water dispersed around the site so water flow paths and residence times are long</li> <li>Soil microbial processes are mature, suggested by dead wood, thick organic layer, many large-diameter trees</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>None of site constructed from upland</li> <li>Most of the site has complex microtopography</li> <li>Site is burned annually or biennially</li> </ul>	0.3 0.4 0.5 0.3 0.3 ?	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> <li>No surface water or saturation remains year-round</li> <li>If seasonal flooding occurs, surface water is concentrated in one part of site (channel, pond) and doesn't remain for long</li> <li>Soil microbial processes not well developed, suggested by lack of dead wood, thick organic layer, many large-diameter trees</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>Most of the site has no noticeable microtopography</li> <li>Site has not been burned in recent years</li> </ul>
Function Capacity Score:	0.4	high opportunity but low residence time
<b>Primary Production</b>		
<ul style="list-style-type: none"> <li>All of site has vascular plants and/or water with algae</li> <li>A variety of plant forms is present in about equal proportions and is well-distributed</li> <li>Some shallow (&lt;3 ft) surface water remains year-round, and in summer is dispersed around the site</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>Site's contributing watershed contains no cropland, paved surface, buildings, or lawns</li> </ul>	0.6 0.5 0.4 0.3 0.8	<ul style="list-style-type: none"> <li>Much of site is devoid of vascular plants and/or algae</li> <li>Whatever plants are present are mainly of a single form</li> <li>The site is entirely dry during much of the year</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>The site's contributing watershed is almost entirely cropland, paved surface, buildings, and lawns</li> </ul>
Function Capacity Score:	0.5	
<b>Thermoregulation</b> (only assess at riverine sites where part of the site is permanently inundated & connected to other water body)		
<ul style="list-style-type: none"> <li>Entire water surface in summer is shaded by closed tree canopy or topography</li> <li>Almost the entire site consists of water deeper than 6 ft</li> </ul>	0.4 0.6	<ul style="list-style-type: none"> <li>None of water is shaded by vegetation or topography</li> <li>All of water is shallower than 2 m during summer</li> <li>Very little of the site contains permanent water</li> <li>Water is never deeper than a few inches</li> </ul>
Function Capacity Score:	0.5	



HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Resident Fish Habitat Support</b> (only assess if part of the site is permanently inundated and subclass is RI)		
<ul style="list-style-type: none"> <li>Permanent water is extensive</li> <li>Site is connected only briefly with channels</li> <li>Non-native fish species are absent</li> </ul>	0.8	<ul style="list-style-type: none"> <li>Permanent water is very limited</li> <li>Non-native species dominate the resident fish component, although some natives are present</li> </ul>
<ul style="list-style-type: none"> <li>Shallow water area and proportion of site that is inundated only seasonally is large enough to support spawning</li> <li>Supports high densities of aquatic invertebrates</li> </ul>	0.8	<ul style="list-style-type: none"> <li>Shorelines are steep, dropping sharply into water deeper than 6 ft</li> <li>Little or no seasonal zone is present</li> </ul>
<ul style="list-style-type: none"> <li>Cover providing year-round shelter from predators is abundant</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> </ul>	0.6	<ul style="list-style-type: none"> <li>Cover is scarce or lacking where water is present seasonally</li> <li>Water is heavily contaminated, oxygen deficits</li> </ul>
Function Capacity Score:	0.7	Primary Function - Speckled dace
<b>Anadromous Fish Habitat Support</b> (only assess if part of site is accessible to anadromous fish during seasonal inundation)		
<ul style="list-style-type: none"> <li>Floodwaters spill into site across a broad bank or wide, unobstructed mouth</li> <li>Floodwaters remain for more than a few days</li> <li>Non-native fish species are generally absent</li> <li>Substrates suitable for spawning or feeding are extensively present</li> <li>Cover that provides shelter from currents and predators is abundant, at least in seasonal zone</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> <li>Summertime temperature maxima do not exceed preferred range of anadromous fish</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Floodwaters enter most of the site entirely through a narrow channel, ditch, or pipe</li> <li>No surface water remains for more than a few days</li> <li>Non-native fish species predominate</li> <li>Substrates suitable for spawning or feeding are scarce or absent</li> <li>Cover that provides shelter from currents and predators is scarce or lacking from all parts of site</li> <li>Water is heavily contaminated, oxygen deficits</li> <li>Summertime temperature maxima exceed limits lethal to anadromous fish</li> </ul>
Function Capacity Score:	✓	
<b>Invertebrate Habitat Support</b>		
<ul style="list-style-type: none"> <li>Surface water is permanent or nearly permanent</li> <li>All of water is shallower than 2 ft during May-Sept</li> </ul>	0.8	<ul style="list-style-type: none"> <li>Surface water is present only briefly (RI sites) or not at all (SF sites), OR</li> <li>Nearly all water remains deeper than 6 ft during May-Sept</li> </ul>
<ul style="list-style-type: none"> <li>Cover that supports algae and provides shelter from currents and predators is abundant in both seasonal and permanent zone</li> <li>Plant forms and species are highly diverse</li> <li>Vegetation is well-interspersed with pools</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.8	<ul style="list-style-type: none"> <li>Cover that supports algae and provides shelter from currents and predators is lacking</li> <li>Only one plant form is present, and species richness is low</li> <li>Vegetation and pools are in 2 separate areas</li> <li>Water is heavily contaminated, oxygen deficits</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR</li> <li>Site was entirely constructed from upland</li> </ul>
<ul style="list-style-type: none"> <li>Surrounding landscape contains large acreage of wetlands, including some with different water regime than site</li> </ul>	0.6	<ul style="list-style-type: none"> <li>Surrounding landscape contains no wetlands or ponds</li> </ul>
Function Capacity Score:	0.5	
<b>Amphibian and Turtle Habitat</b>		
<ul style="list-style-type: none"> <li>Permanent water is absent, but shallow surface water with partly-submerged fine-stemmed herbs is extensive, and recedes very gradually during Jan-May (at least 30 days when water levels fluctuate &lt;2 inches), OR</li> <li>Permanent water is extensive and contains abundant underwater cover and partly-submerged fine-stemmed herbs</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Site never contains surface water, OR</li> <li>Site is entirely surface water, which either never fluctuates vertically (no seasonal zone present), or fluctuates too much (&gt;2 inches during all 10-day periods), or is devoid of any emergent herbs that are partly-submerged during springtime, or flows faster than 4"/sec during the entire spring, everywhere, or is mostly deeper than 40" and is bordered by shoreline with very steep slope</li> </ul>
<ul style="list-style-type: none"> <li>Bullfrogs and other non-native predators are absent</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Bullfrogs and other non-native predators are abundant</li> </ul>
<ul style="list-style-type: none"> <li>If surface water everywhere in the site is flowing during springtime, there are at least 30 days when current velocities are &lt;4"/sec</li> </ul>	0.5	<ul style="list-style-type: none"> <li>If surface water everywhere in the site is flowing during springtime, there are never more than 30 days when current velocities are &lt;4"/sec</li> </ul>
<ul style="list-style-type: none"> <li>Extensive and varied woody debris in seasonal zone</li> </ul>	0.3	<ul style="list-style-type: none"> <li>No woody debris in seasonal zone</li> </ul>
<ul style="list-style-type: none"> <li>Either vegetation and pools are well-interspersed during high water level, or woody vegetation bordering the larger pools is located mostly on the north end</li> <li>Microtopography is quite varied</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Vegetation and pools are in separate areas of the site during high water level, and any woody vegetation bordering the larger pools is located mostly on their south end.</li> <li>Microtopography is too flat to form puddles</li> </ul>

desert sucker support

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<ul style="list-style-type: none"> <li>Suitable basking sites for turtles and calling sites for frogs are present</li> </ul>	0.3	<ul style="list-style-type: none"> <li>There are no basking sites for turtles or calling sites for frogs</li> </ul>
<ul style="list-style-type: none"> <li>Land cover in adjoining uplands is a mix of natural grassland and woodland w/ extensive woody debris</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Land cover in adjoining uplands contains impervious surface, bare ground, lawns, and row crops</li> </ul>
<ul style="list-style-type: none"> <li>Shorelines are gently sloping</li> </ul>	0.6	<ul style="list-style-type: none"> <li>Shorelines are mostly steep</li> </ul>
<ul style="list-style-type: none"> <li>Busy roads are distant from the site</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Busy roads adjoin the site</li> </ul>
<ul style="list-style-type: none"> <li>Many other wetlands are present nearby</li> </ul>	0.5	<ul style="list-style-type: none"> <li>There are no other wetlands nearby</li> </ul>
<ul style="list-style-type: none"> <li>Water quality is excellent</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Water is heavily contaminated, oxygen deficits</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR</li> <li>Site was entirely constructed from upland</li> </ul>
<ul style="list-style-type: none"> <li>Soils and submerged sediments contain a moderately thick organic layer (leaf litter, peat, decomposed organics, etc.)</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Soils and submerged sediments contain no organic layer, and are mostly hard-packed clay, OR</li> <li>Organic layer is so thick that water is chronically anoxic</li> </ul>
Function Capacity Score: 0.4		moderate capacity
<b>Breeding Waterbird Support</b>		
<ul style="list-style-type: none"> <li>The site contains many acres of (nearly) permanent surface water, or a large permanent wetland is located nearby, AND</li> <li>Water depths are shallow (2-24 inches) in Apr-Aug</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Surface water is present for only a few weeks during Apr-June, OR</li> <li>Nearly all water remains deeper than 6 ft during May-Sept, AND</li> <li>No permanent wetlands are located nearby</li> </ul>
<ul style="list-style-type: none"> <li>Most of the shoreline is not steep</li> </ul>	0.6	<ul style="list-style-type: none"> <li>Most of the shoreline is steep</li> </ul>
<ul style="list-style-type: none"> <li>Larger pools of water are bordered by wide, dense band of tall herbs/shrubs during Apr-Aug</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Larger pools are bordered by only a narrow band of sparse vegetation</li> </ul>
<ul style="list-style-type: none"> <li>About equal proportions of water and vegetation are present, and are well-interspersed during Apr-Aug</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Vegetation and pools are in 2 separate areas or zones, not interspersed</li> </ul>
<ul style="list-style-type: none"> <li>Water levels do not abruptly rise a foot or more during Apr-June</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Water levels are prone to quickly rise at least 1 foot during Apr-June</li> </ul>
<ul style="list-style-type: none"> <li>A large variety of herbs is present</li> <li>Site is actively managed to control spread of non-native or invasive species</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species</li> </ul>
<ul style="list-style-type: none"> <li>Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, and water</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops</li> </ul>
<ul style="list-style-type: none"> <li>Busy roads are distant from the site</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Busy roads border the site</li> </ul>
<ul style="list-style-type: none"> <li>Water quality is excellent</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Water is heavily contaminated with pollutants</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled,</li> </ul>
<ul style="list-style-type: none"> <li>Surrounding landscape contains large acreage of wetlands, including some with different water regime than site</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Surrounding landscape contains no wetlands or ponds</li> </ul>
<ul style="list-style-type: none"> <li>Nest boxes, nest platforms, and other artificial structures are extensive and regularly maintained</li> </ul>	0.2	<ul style="list-style-type: none"> <li>No nest boxes, nest platforms, or other artificial structures are present, or aren't well-maintained</li> </ul>
<ul style="list-style-type: none"> <li>None of the site is visited frequently by humans on foot in April-June</li> </ul>	0.4	<ul style="list-style-type: none"> <li>All of the site is visited frequently by humans on foot during April-June</li> </ul>
Function Capacity Score: 0.4		
<b>Wintering and Migratory Waterbird Support</b>		
<ul style="list-style-type: none"> <li>The site contains extensive surface water during all or most of the fall-winter-spring period</li> </ul>	0.4	<ul style="list-style-type: none"> <li>The site contains very little surface water during all or most of the fall-winter-spring period</li> </ul>
<ul style="list-style-type: none"> <li>Water depths during most of the fall-winter-spring period are shallow (&lt;24 inches)</li> </ul>	0.7	<ul style="list-style-type: none"> <li>If forested, water depths during the fall-winter-spring period are always shallower than 24"</li> </ul>
<ul style="list-style-type: none"> <li>A large portion of the site is inundated only seasonally</li> </ul>	0.6	<ul style="list-style-type: none"> <li>Of the water that is present, nearly all is present year-round</li> </ul>
<ul style="list-style-type: none"> <li>The acreage of various depth categories is about equal during peak annual inundation</li> </ul>	0.5	<ul style="list-style-type: none"> <li>A single water depth category predominates</li> </ul>
<ul style="list-style-type: none"> <li>Microtopographic variation is extensive</li> </ul>	0.3	<ul style="list-style-type: none"> <li>The substrate is flat, prohibiting puddle formation</li> </ul>
<ul style="list-style-type: none"> <li>None of the site is visited frequently by humans on foot during September-Apr</li> </ul>	0.4	<ul style="list-style-type: none"> <li>All of the site is visited frequently by humans on foot during September-April</li> </ul>
<ul style="list-style-type: none"> <li>A large variety of herbs is present</li> <li>Site is actively managed to control the spread of non-native or invasive species</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species</li> </ul>
<ul style="list-style-type: none"> <li>Water quality is excellent</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Water is heavily contaminated with pollutants</li> </ul>

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.3	• Substrates have recently been recontoured, compacted, excavated, plowed, disked or leveled
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water	0.5	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• Surrounding landscape contains large acreage of hydric soil, wetlands, and water, including some with a different water regime	0.5	• Surrounding landscape contains no wetlands, ponds, or hydric soil
Function Capacity Score:		0.4
<b>Songbird Habitat Support</b>		
• Some part of the site contains surface water during all of the year	0.8	• Surface water is never present at any time of the year
• The site contains a large acreage of closed-canopy forest, native shrubland, wet prairie, and/or emergent wetland	0.5	• Acreage of these is very small <i>Relatively large w/in basin</i>
• If the site is mostly native shrubland and/or forest then large-diameter trees, snags, and undercanopy shrub cover are extensive, and a large variety of trees, shrubs, and vines is present	N/A	• If the site is mostly shrubland and/or forest, then trees are small, snags are absent, under-canopy shrub cover is lacking, and the variety of trees, shrubs, and vines is small and comprised of non-native species
• If the site is mostly wet prairie and/or emergent wetland, then a large variety of herbs is present, the site is actively managed to control the spread of non-native or invasive herb species, and trees and shrubs are concentrated in one part of the site	0.7	• If the site is mostly prairie and/or emergent wetland, then the variety of herbs is small, the site is not actively managed, and trees and shrubs are scattered widely throughout the site
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water	0.5	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• None of the site is visited frequently by humans on foot in April through June	0.4	• Every part of the site is visited frequently by humans on foot in April through June
• Busy roads are distant from the site	0.5	• Busy roads adjoin the site
Function Capacity Score:		0.6
<b>Support of Characteristic Vegetation</b>		
• Trees, shrubs, and herbs are all present, and are well-interspersed throughout the site	0.5	• Only one plant form is present
• If trees are present, many are very old and large, with abundant evidence of regeneration	0.4	• If trees are present, all are young
• If shrubs are present, all of the significantly present shrub species are natives	0.8	• If shrubs are present, they are comprised of just one species, and it is non-native
• If herbs are present, all of the significantly present herb species are natives	0.8	• If herbs are present, they are comprised of just one species, and it is non-native
• Microtopographic relief is great	0.3	• The substrate is flat, prohibiting puddle formation
• Springtime surface water levels drop very slowly (<2 vertical inches per 30 days, average)	0.2	• Springtime water levels fluctuate or drop rapidly (>2 inches per 10 days, average)
• None of the site is visited frequently by humans on foot in September through April	0.4	• Every part of the site is visited frequently by humans on foot in September through April
• Busy roads are distant from the site	0.5	• Busy roads adjoin the site
• Land cover in the contributing watershed is predominantly "natural"	0.5	• Land cover in the contributing watershed largely contains impervious surface, bare ground, lawns, and row crops
• Land cover in surrounding buffer zones is predominantly a mix of natural grassland, native shrubland, woodland, wetlands, and water	0.5	• Land cover in surrounding buffer largely contains impervious surface, bare ground, lawns, and row crops
• Water quality is excellent	0.3	• Water is heavily contaminated with pollutants
Function Capacity Score:		0.6



## ASSESSMENT OF FUNCTION CAPACITY: JUDGMENTAL METHOD

Date: 2/26/2008 Project/Site: Caliente Rail Segment - Linear & isolated wetland fragmentsPlot #: AU-4 Investigators: NBH & MPW HGM Classification: Slope

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Water Storage and Delay</b>		
<ul style="list-style-type: none"> <li>Proportion of site inundated seasonally is large</li> <li>Flood marks, stunted plants, and/or distinctive assemblages of plant species</li> <li>Most of surface water in the seasonally inundated zone remains for a few days after each rain event, not less or more</li> </ul>	0.2	<ul style="list-style-type: none"> <li>None of site is inundated only seasonally</li> <li>Site always comprised of permanent water or high water table</li> <li>Water added from rain events empties quickly from all of the site, via outlets or percolation</li> </ul>
<b>Function Capacity Score:</b>		
<b>Sediment Stabilization and Phosphorus Retention</b>		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> <li>Texture of substrate in the upper 12" of seasonal zone is clay, silty clay, sandy clay, clay loam, or native organic</li> <li>Herbs, shrubs, and/or vines together always occupy a large percent of ground cover in seasonal zone</li> <li>Shallow pools and puddles are present and well interspersed with herbaceous vegetation</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>Most of the site has complex microtopography</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> <li>Upper 12" of substrate in seasonal zone is mostly sand or gravel</li> <li>All or nearly all of substrate in seasonal zone is unvegetated</li> <li>Shallow pools are absent at all times of the year</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>Extensive evidence of scour</li> <li>Substrate is uniformly flat, no microtopography</li> </ul>
<b>Function Capacity Score:</b>		
<b>Nitrogen Removal</b> (only proceed if notices or features indicating oxygen deficits in soils in part of the site)		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> <li>Some surface water or saturation remains year-round</li> <li>Surface water dispersed around the site so water flow paths and residence times are long</li> <li>Soil microbial processes are mature, suggested by dead wood, thick organic layer, many large-diameter trees</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>None of site constructed from upland</li> <li>Most of the site has complex microtopography</li> <li>Site is burned annually or biennially</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> <li>No surface water or saturation remains year-round</li> <li>If seasonal flooding occurs, surface water is concentrated in one part of site (channel, pond) and doesn't remain for long</li> <li>Soil microbial processes not well developed, suggested by lack of dead wood, thick organic layer, many large-diameter trees</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>Most of the site has no noticeable microtopography</li> <li>Site has not been burned in recent years</li> </ul>
<b>Function Capacity Score:</b>		
<b>Primary Production</b>		
<ul style="list-style-type: none"> <li>All of site has vascular plants and/or water with algae</li> <li>A variety of plant forms is present in about equal proportions and is well-distributed</li> <li>Some shallow (&lt;3 ft) surface water remains year-round, and in summer is dispersed around the site</li> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>Site's contributing watershed contains no cropland, paved surface, buildings, or lawns</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Much of site is devoid of vascular plants and/or algae</li> <li>Whatever plants are present are mainly of a single form</li> <li>The site is entirely dry during much of the year</li> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>The site's contributing watershed is almost entirely cropland, paved surface, buildings, and lawns</li> </ul>
<b>Function Capacity Score:</b>		
<b>Thermoregulation</b> (only assess at riverine sites where part of the site is permanently inundated & connected to other water body)		
<ul style="list-style-type: none"> <li>Entire water surface in summer is shaded by closed tree canopy or topography</li> <li>Almost the entire site consists of water deeper than 6 ft</li> </ul>	N/A	<ul style="list-style-type: none"> <li>None of water is shaded by vegetation or topography</li> <li>All of water is shallower than 2 m during summer</li> <li>Very little of the site contains permanent water</li> <li>Water is never deeper than a few inches</li> </ul>
<b>Function Capacity Score:</b>		

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Resident Fish Habitat Support</b> (only assess if part of the site is permanently inundated and subclass is R1)		
<ul style="list-style-type: none"> <li>Permanent water is extensive</li> <li>Site is connected only briefly with channels</li> <li>Non-native fish species are absent</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Permanent water is very limited</li> <li>Non-native species dominate the resident fish component, although some natives are present</li> <li>Shorelines are steep, dropping sharply into water deeper than 6 ft</li> <li>Little or no seasonal zone is present</li> <li>Cover is scarce or lacking where water is present seasonally</li> <li>Water is heavily contaminated, oxygen deficits</li> </ul>
<ul style="list-style-type: none"> <li>Shallow water area and proportion of site that is inundated only seasonally is large enough to support spawning</li> <li>Supports high densities of aquatic invertebrates</li> <li>Cover providing year-round shelter from predators is abundant</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> </ul>	✓ 0	
<b>Function Capacity Score:</b>		
<b>Anadromous Fish Habitat Support</b> (only assess if part of site is accessible to anadromous fish during seasonal inundation)		
<ul style="list-style-type: none"> <li>Floodwaters spill into site across a broad bank or wide, unobstructed mouth</li> <li>Floodwaters remain for more than a few days</li> <li>Non-native fish species are generally absent</li> <li>Substrates suitable for spawning or feeding are extensively present</li> <li>Cover that provides shelter from currents and predators is abundant, at least in seasonal zone</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> <li>Summertime temperature maxima do not exceed preferred range of anadromous fish</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Floodwaters enter most of the site entirely through a narrow channel, ditch, or pipe</li> <li>No surface water remains for more than a few days</li> <li>Non-native fish species predominate</li> <li>Substrates suitable for spawning or feeding are scarce or absent</li> <li>Cover that provides shelter from currents and predators is scarce or lacking from all parts of site</li> <li>Water is heavily contaminated, oxygen deficits</li> <li>Summertime temperature maxima exceed limits lethal to anadromous fish</li> </ul>
<b>Function Capacity Score:</b>		
<b>Invertebrate Habitat Support</b>		
<ul style="list-style-type: none"> <li>Surface water is permanent or nearly permanent</li> <li>All of water is shallower than 2 ft during May-Sept</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Surface water is present only briefly (R1 sites) or not at all (SF sites), OR</li> <li>Nearly all water remains deeper than 6 ft during May-Sept</li> </ul>
<ul style="list-style-type: none"> <li>Cover that supports algae and provides shelter from currents and predators is abundant in both seasonal and permanent zone</li> <li>Plant forms and species are highly diverse</li> <li>Vegetation is well-interspersed with pools</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Cover that supports algae and provides shelter from currents and predators is lacking</li> <li>Only one plant form is present, and species richness is low</li> <li>Vegetation and pools are in 2 separate areas</li> <li>Water is heavily contaminated, oxygen deficits</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR</li> <li>Site was entirely constructed from upland</li> </ul>
<ul style="list-style-type: none"> <li>Surrounding landscape contains large acreage of wetlands, including some with different water regime than site</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Surrounding landscape contains no wetlands or ponds</li> </ul>
<b>Function Capacity Score:</b>		
<b>Amphibian and Turtle Habitat</b>		
<ul style="list-style-type: none"> <li>Permanent water is absent, but shallow surface water with partly-submerged fine-stemmed herbs is extensive, and recedes very gradually during Jan-May (at least 30 days when water levels fluctuate &lt;2 inches), OR</li> <li>Permanent water is extensive and contains abundant underwater cover and partly-submerged fine-stemmed herbs</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Site never contains surface water, OR</li> <li>Site is entirely surface water, which either never fluctuates vertically (no seasonal zone present), or fluctuates too much (&gt;2 inches during all 10-day periods), or is devoid of any emergent herbs that are partly-submerged during springtime, or flows faster than 4"/sec during the entire spring, everywhere, or is mostly deeper than 40" and is bordered by shoreline with very steep slope</li> </ul>
<ul style="list-style-type: none"> <li>Bullfrogs and other non-native predators are absent</li> </ul>	0.1	<ul style="list-style-type: none"> <li>Bullfrogs and other non-native predators are abundant</li> </ul>
<ul style="list-style-type: none"> <li>If surface water everywhere in the site is flowing during springtime, there are at least 30 days when current velocities are &lt;4"/sec</li> </ul>	N/A	<ul style="list-style-type: none"> <li>If surface water everywhere in the site is flowing during springtime, there are never more than 30 days when current velocities are &lt;4"/sec</li> </ul>
<ul style="list-style-type: none"> <li>Extensive and varied woody debris in seasonal zone</li> </ul>	0.1	<ul style="list-style-type: none"> <li>No woody debris in seasonal zone</li> </ul>
<ul style="list-style-type: none"> <li>Either vegetation and pools are well-interspersed during high water level, or woody vegetation bordering the larger pools is located mostly on the north end</li> <li>Microtopography is quite varied</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Vegetation and pools are in separate areas of the site during high water level, and any woody vegetation bordering the larger pools is located mostly on their south end</li> <li>Microtopography is too flat to form puddles</li> </ul>

stagnant / low DO

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
• Suitable basking sites for turtles and calling sites for frogs are present	0.5	• There are no basking sites for turtles or calling sites for frogs
• Land cover in adjoining uplands is a mix of natural grassland and woodland w/ extensive woody debris	0.4	• Land cover in adjoining uplands contains impervious surface, bare ground, lawns, and row crops
• Shorelines are gently sloping	0.4	• Shorelines are mostly steep
• Busy roads are distant from the site	0.4	• Busy roads adjoin the site
• Many other wetlands are present nearby	0.5	• There are no other wetlands nearby
• Water quality is excellent	0.2	• Water is heavily contaminated, oxygen deficits
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.3	• Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR
• No evidence of severe erosion		• Site was entirely constructed from upland
• Soils and submerged sediments contain a moderately thick organic layer (leaf litter, peat, decomposed organics, etc.)	0.4	• Soils and submerged sediments contain no organic layer, and are mostly hard-packed clay, OR
		• Organic layer is so thick that water is chronically anoxic
Function Capacity Score:		0.3
<b>Breeding Waterbird Support</b>		
• The site contains many acres of (nearly) permanent surface water, or a large permanent wetland is located nearby, AND	0.4	• Surface water is present for only a few weeks during Apr-June, OR
• Water depths are shallow (2-24 inches) in Apr-Aug		• Nearly all water remains deeper than 6 ft during May-Sept, AND
		• No permanent wetlands are located nearby
• Most of the shoreline is not steep	0.4	• Most of the shoreline is steep
• Larger pools of water are bordered by wide, dense band of tall herbs/shrubs during Apr-Aug	0.2	• Larger pools are bordered by only a narrow band of sparse vegetation
• About equal proportions of water and vegetation are present, and are well-interspersed during Apr-Aug	0.3	• Vegetation and pools are in 2 separate areas or zones, not interspersed
• Water levels do not abruptly rise a foot or more during Apr-June	0.3	• Water levels are prone to quickly rise at least 1 foot during Apr-June
• A large variety of herbs is present	0.3	• Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species
• Site is actively managed to control spread of non-native or invasive species		
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, and water	0.4	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• Busy roads are distant from the site	0.4	• Busy roads border the site
• Water quality is excellent	0.2	• Water is heavily contaminated with pollutants
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.3	• Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled,
• Surrounding landscape contains large acreage of wetlands, including some with different water regime than site	0.5	• Surrounding landscape contains no wetlands or ponds
• Nest boxes, nest platforms, and other artificial structures are extensive and regularly maintained	0.1	• No nest boxes, nest platforms, or other artificial structures are present, or aren't well-maintained
• None of the site is visited frequently by humans on foot in April-June	0.4	• All of the site is visited frequently by humans on foot during April-June
Function Capacity Score:		0.3
<b>Wintering and Migratory Waterbird Support</b>		
• The site contains extensive surface water during all or most of the fall-winter-spring period	0.2	• The site contains very little surface water during all or most of the fall-winter-spring period
• Water depths during most of the fall-winter-spring period are shallow (<24 inches)	0.6	• If forested, water depths during the fall-winter-spring period are always shallower than 24"
• A large portion of the site is inundated only seasonally	0.6	• Of the water that is present, nearly all is present year-round
• The acreage of various depth categories is about equal during peak annual inundation	0.2	• A single water depth category predominates
• Microtopographic variation is extensive	0.2	• The substrate is flat, prohibiting puddle formation
• None of the site is visited frequently by humans on foot during September-Apr	0.4	• All of the site is visited frequently by humans on foot during September-April
• A large variety of herbs is present	0.3	• Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species
• Site is actively managed to control the spread of non-native or invasive species		
• Water quality is excellent	0.2	• Water is heavily contaminated with pollutants

perm. water nearby



HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.3	• Substrates have recently been recontoured, compacted, excavated, plowed, disked or leveled,
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water	0.4	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• Surrounding landscape contains large acreage of hydric soil, wetlands, and water, including some with a different water regime	0.5	• Surrounding landscape contains no wetlands, ponds, or hydric soil
Function Capacity Score:		0.3
<b>Songbird Habitat Support</b>		
• Some part of the site contains surface water during all of the year	0.2	• Surface water is never present at any time of the year
• The site contains a large acreage of closed-canopy forest, native shrubland, wet prairie, and/or emergent wetland	0.2	• Acreage of these is very small
• If the site is mostly native shrubland and/or forest then large-diameter trees, snags, and undercanopy shrub cover are extensive, and a large variety of trees, shrubs, and vines is present	N/A	• If the site is mostly shrubland and/or forest, then trees are small, snags are absent, under-canopy shrub cover is lacking, and the variety of trees, shrubs, and vines is small and comprised of non-native species
• If the site is mostly wet prairie and/or emergent wetland, then a large variety of herbs is present, the site is actively managed to control the spread of non-native or invasive herb species, and trees and shrubs are concentrated in one part of the site	0.3	• If the site is mostly prairie and/or emergent wetland, then the variety of herbs is small, the site is not actively managed, and trees and shrubs are scattered widely throughout the site
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water	0.4	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• None of the site is visited frequently by humans on foot in April through June	0.4	• Every part of the site is visited frequently by humans on foot in April through June
• Busy roads are distant from the site	0.4	• Busy roads adjoin the site
Function Capacity Score:		0.3
<b>Support of Characteristic Vegetation</b>		
• Trees, shrubs, and herbs are all present, and are well-interspersed throughout the site	0.2	• Only one plant form is present
• If trees are present, many are very old and large, with abundant evidence of regeneration	0.2	• If trees are present, all are young
• If shrubs are present, all of the significantly present shrub species are natives	0.5	• If shrubs are present, they are comprised of just one species, and it is non-native
• If herbs are present, all of the significantly present herb species are natives	0.5	• If herbs are present, they are comprised of just one species, and it is non-native
• Microtopographic relief is great	0.2	• The substrate is flat, prohibiting puddle formation
• Springtime surface water levels drop very slowly (<2 vertical inches per 30 days, average)	0.2	• Springtime water levels fluctuate or drop rapidly (>2 inches per 10 days, average)
• None of the site is visited frequently by humans on foot in September through April	0.4	• Every part of the site is visited frequently by humans on foot in September through April
• Busy roads are distant from the site	0.4	• Busy roads adjoin the site
• Land cover in the contributing watershed is predominantly "natural"	0.4	• Land cover in the contributing watershed largely contains impervious surface, bare ground, lawns, and row crops
• Land cover in surrounding buffer zones is predominantly a mix of natural grassland, native shrubland, woodland, wetlands, and water	0.5	• Land cover in surrounding buffer largely contains impervious surface, bare ground, lawns, and row crops
• Water quality is excellent	0.2	• Water is heavily contaminated with pollutants
Function Capacity Score:		0.3

grazed, weedy

isolated - contributing watershed is tiny

# WETLAND # AV5

## ASSESSMENT OF FUNCTION CAPACITY: JUDGMENTAL METHOD

Date: 2/26/08 Project/Site: Caliente Segment - Depressional Wetlands, typically old borrow areas  
 Plot #: AV-5 Investigators: NBH, MPW HGM Classification: Depressional Closed, non-permanently flooded

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Water Storage and Delay</b>		
<ul style="list-style-type: none"> <li>Proportion of site inundated seasonally is large</li> <li>Flood marks, stunted plants, and/or distinctive assemblages of plant species</li> </ul>	0.8	<ul style="list-style-type: none"> <li>None of site is inundated only seasonally</li> <li>Site always comprised of permanent water or high water table</li> </ul>
<ul style="list-style-type: none"> <li>Most of surface water in the seasonally inundated zone remains for a few days after each rain event, not less or more</li> </ul>	0.6	<ul style="list-style-type: none"> <li>Water added from rain events empties quickly from all of the site, via outlets or percolation</li> </ul>
Function Capacity Score:	0.7	
<b>Sediment Stabilization and Phosphorus Retention</b>		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> <li>Texture of substrate in the upper 12" of seasonal zone is clay, silty clay, sandy clay, clay loam, or native organic</li> </ul>	0.7	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> <li>Upper 12" of substrate in seasonal zone is mostly sand or gravel</li> </ul>
<ul style="list-style-type: none"> <li>Herbs, shrubs, and/or vines together always occupy a large percent of ground cover in seasonal zone</li> </ul>	0.5	<ul style="list-style-type: none"> <li>All or nearly all of substrate in seasonal zone is unvegetated</li> </ul>
<ul style="list-style-type: none"> <li>Shallow pools and puddles are present and well interspersed with herbaceous vegetation</li> </ul>	0.6	<ul style="list-style-type: none"> <li>Shallow pools are absent at all times of the year</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>→ not since creation</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>Extensive evidence of scour <u>here</u></li> </ul>
<ul style="list-style-type: none"> <li>Most of the site has complex microtopography</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Substrate is uniformly flat, no microtopography</li> </ul>
Function Capacity Score:	0.5	
<b>Nitrogen Removal</b> (only proceed if mottles or features indicating oxygen deficits in soils in part of the site)		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> <li>Some surface water or saturation remains year-round</li> <li>Surface water dispersed around the site so water flow paths and residence times are long</li> </ul>	0.7	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> <li>No surface water or saturation remains year-round</li> <li>If seasonal flooding occurs, surface water is concentrated in one part of site (channel, pond) and doesn't remain for long</li> </ul>
<ul style="list-style-type: none"> <li>Soil microbial processes are mature, suggested by dead wood, thick organic layer, many large-diameter trees</li> </ul>	0.6	<ul style="list-style-type: none"> <li>Soil microbial processes not well developed, suggested by lack of dead wood, thick organic layer, many large-diameter trees</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>None of site constructed from upland</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> </ul>
<ul style="list-style-type: none"> <li>Most of the site has complex microtopography</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Most of the site has no noticeable microtopography</li> </ul>
<ul style="list-style-type: none"> <li>Site is burned annually or biennially</li> </ul>	?	<ul style="list-style-type: none"> <li>Site has not been burned in recent years</li> </ul>
Function Capacity Score:	0.6	
<b>Primary Production</b>		
<ul style="list-style-type: none"> <li>All of site has vascular plants and/or water with algae</li> </ul>	0.6	<ul style="list-style-type: none"> <li>Much of site is devoid of vascular plants and/or algae</li> </ul>
<ul style="list-style-type: none"> <li>A variety of plant forms is present in about equal proportions and is well-distributed</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Whatever plants are present are mainly of a single form</li> </ul>
<ul style="list-style-type: none"> <li>Some shallow (&lt;3 ft) surface water remains year-round, and in summer is dispersed around the site</li> </ul>	0.6	<ul style="list-style-type: none"> <li>The site is entirely dry during much of the year</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> </ul>
<ul style="list-style-type: none"> <li>Site's contributing watershed contains no cropland, paved surface, buildings, or lawns</li> </ul>	0.6	<ul style="list-style-type: none"> <li>The site's contributing watershed is almost entirely cropland, paved surface, buildings, and lawns</li> </ul>
Function Capacity Score:	0.5	
<b>Thermoregulation</b> (only assess at riverine sites where part of the site is permanently inundated & connected to other water body)		
<ul style="list-style-type: none"> <li>Entire water surface in summer is shaded by closed tree canopy or topography</li> </ul>	N/A	<ul style="list-style-type: none"> <li>None of water is shaded by vegetation or topography</li> <li>All of water is shallower than 2 m during summer</li> </ul>
<ul style="list-style-type: none"> <li>Almost the entire site consists of water deeper than 6 ft</li> </ul>	~	<ul style="list-style-type: none"> <li>Very little of the site contains permanent water</li> <li>Water is never deeper than a few inches</li> </ul>
Function Capacity Score:	~	non-riverine / not connected



HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Resident Fish Habitat Support</b> (only assess if part of the site is permanently inundated and subclass is RI)		
<ul style="list-style-type: none"> <li>Permanent water is extensive</li> <li>Site is connected only briefly with channels</li> <li>Non-native fish species are absent</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Permanent water is very limited</li> <li>Non-native species dominate the resident fish component, although some natives are present</li> </ul>
<ul style="list-style-type: none"> <li>Shallow water area and proportion of site that is inundated only seasonally is large enough to support spawning</li> <li>Supports high densities of aquatic invertebrates</li> <li>Cover providing year-round shelter from predators is abundant</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> </ul>		<ul style="list-style-type: none"> <li>Shorelines are steep, dropping sharply into water deeper than 6 ft</li> <li>Little or no seasonal zone is present</li> <li>Cover is scarce or lacking where water is present seasonally</li> <li>Water is heavily contaminated, oxygen deficits</li> </ul>
<b>Function Capacity Score:</b>		
<b>Anadromous Fish Habitat Support</b> (only assess if part of site is accessible to anadromous fish during seasonal inundation)		
<ul style="list-style-type: none"> <li>Floodwaters spill into site across a broad bank or wide, unobstructed mouth</li> <li>Floodwaters remain for more than a few days</li> <li>Non-native fish species are generally absent</li> <li>Substrates suitable for spawning or feeding are extensively present</li> <li>Cover that provides shelter from currents and predators is abundant, at least in seasonal zone</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> <li>Summertime temperature maxima do not exceed preferred range of anadromous fish</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Floodwaters enter most of the site entirely through a narrow channel, ditch, or pipe</li> <li>No surface water remains for more than a few days</li> <li>Non-native fish species predominate</li> <li>Substrates suitable for spawning or feeding are scarce or absent</li> <li>Cover that provides shelter from currents and predators is scarce or lacking from all parts of site</li> <li>Water is heavily contaminated, oxygen deficits</li> <li>Summertime temperature maxima exceed limits lethal to anadromous fish</li> </ul>
<b>Function Capacity Score:</b>		
<b>Invertebrate Habitat Support</b>		
<ul style="list-style-type: none"> <li>Surface water is permanent or nearly permanent</li> <li>All of water is shallower than 2 ft during May-Sept</li> </ul>	0.8	<ul style="list-style-type: none"> <li>Surface water is present only briefly (RI sites) or not at all (SF sites), OR</li> <li>Nearly all water remains deeper than 6 ft during May-Sept</li> </ul>
<ul style="list-style-type: none"> <li>Cover that supports algae and provides shelter from currents and predators is abundant in both seasonal and permanent zone</li> <li>Plant forms and species are highly diverse</li> </ul>	0.7	<ul style="list-style-type: none"> <li>Cover that supports algae and provides shelter from currents and predators is lacking</li> <li>Only one plant form is present, and species richness is low</li> </ul>
<ul style="list-style-type: none"> <li>Vegetation is well-interspersed with pools</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Vegetation and pools are in 2 separate areas</li> <li>Water is heavily contaminated, oxygen deficits</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR</li> <li>Site was entirely constructed from upland</li> </ul>
<ul style="list-style-type: none"> <li>Surrounding landscape contains large acreage of wetlands, including some with different water regime than site</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Surrounding landscape contains no wetlands or ponds</li> </ul>
<b>Function Capacity Score:</b>		0.5
<b>Amphibian and Turtle Habitat</b>		
<ul style="list-style-type: none"> <li>Permanent water is absent, but shallow surface water with partly-submerged fine-stemmed herbs is extensive, and recedes very gradually during Jan-May (at least 30 days when water levels fluctuate &lt;2 inches), OR</li> <li>Permanent water is extensive and contains abundant underwater cover and partly-submerged fine-stemmed herbs</li> </ul>	0.8	<ul style="list-style-type: none"> <li>Site never contains surface water, OR</li> <li>Site is entirely surface water, which either never fluctuates vertically (no seasonal zone present), or fluctuates too much (&gt;2 inches during all 10-day periods), or is devoid of any emergent herbs that are partly-submerged during springtime, or flows faster than 4"/sec during the entire spring, everywhere, or is mostly deeper than 40" and is bordered by shoreline with very steep slope</li> </ul>
<ul style="list-style-type: none"> <li>Bullfrogs and other non-native predators are absent</li> </ul>	0.1	<ul style="list-style-type: none"> <li>Bullfrogs and other non-native predators are abundant</li> </ul>
<ul style="list-style-type: none"> <li>If surface water everywhere in the site is flowing during springtime, there are at least 30 days when current velocities are &lt;4"/sec</li> </ul>	N/A	<ul style="list-style-type: none"> <li>If surface water everywhere in the site is flowing during springtime, there are never more than 30 days when current velocities are &lt;4"/sec</li> </ul>
<ul style="list-style-type: none"> <li>Extensive and varied woody debris in seasonal zone</li> </ul>	0	<ul style="list-style-type: none"> <li>No woody debris in seasonal zone</li> </ul>
<ul style="list-style-type: none"> <li>Either vegetation and pools are well-interspersed during high water level, or woody vegetation bordering the larger pools is located mostly on the north end</li> <li>Microtopography is quite varied</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Vegetation and pools are in separate areas of the site during high water level, and any woody vegetation bordering the larger pools is located mostly on their south end</li> <li>Microtopography is too flat to form puddles</li> </ul>

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
• Suitable basking sites for turtles and calling sites for frogs are present	0.5	• There are no basking sites for turtles or calling sites for frogs
• Land cover in adjoining uplands is a mix of natural grassland and woodland w/ extensive woody debris	0.5	• Land cover in adjoining uplands contains impervious surface, bare ground, lawns, and row crops
• Shorelines are gently sloping	0.5	• Shorelines are mostly steep
• Busy roads are distant from the site	0.5	• Busy roads adjoin the site
• Many other wetlands are present nearby	0.5	• There are no other wetlands nearby
• Water quality is excellent	0.4	• Water is heavily contaminated, oxygen deficits
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.5	• Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR
• No evidence of severe erosion		• Site was entirely constructed from upland
• Soils and submerged sediments contain a moderately thick organic layer (leaf litter, peat, decomposed organics, etc.)	0.5	• Soils and submerged sediments contain no organic layer, and are mostly hard-packed clay, OR
		• Organic layer is so thick that water is chronically anoxic
Function Capacity Score:		0.5
<b>Breeding Waterbird Support</b>		
• The site contains many acres of (nearly) permanent surface water, or a large permanent wetland is located nearby, AND	0.8	• Surface water is present for only a few weeks during Apr-June, OR
• Water depths are shallow (2-24 inches) in Apr-Aug		• Nearly all water remains deeper than 6 ft during May-Sept, AND
• Most of the shoreline is not steep	0.7	• No permanent wetlands are located nearby
• Larger pools of water are bordered by wide, dense band of tall herbs/shrubs during Apr-Aug	0.8	• Most of the shoreline is steep
• About equal proportions of water and vegetation are present, and are well-interspersed during Apr-Aug	0.6	• Larger pools are bordered by only a narrow band of sparse vegetation
• Water levels do not abruptly rise a foot or more during Apr-June	0.4	• Vegetation and pools are in 2 separate areas or zones, not interspersed
• A large variety of herbs is present	0.5	• Water levels are prone to quickly rise at least 1 foot during Apr-June
• Site is actively managed to control spread of non-native or invasive species		• Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, and water	0.5	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• Busy roads are distant from the site	0.5	• Busy roads border the site
• Water quality is excellent	0.4	• Water is heavily contaminated with pollutants
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.5	• Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled,
• Surrounding landscape contains large acreage of wetlands, including some with different water regime than site	0.5	• Surrounding landscape contains no wetlands or ponds
• Nest boxes, nest platforms, and other artificial structures are extensive and regularly maintained	0	• No nest boxes, nest platforms, or other artificial structures are present, or aren't well-maintained
• None of the site is visited frequently by humans on foot in April-June	0.4	• All of the site is visited frequently by humans on foot during April-June
Function Capacity Score:		0.5
<b>Wintering and Migratory Waterbird Support</b>		
• The site contains extensive surface water during all or most of the fall-winter-spring period	0.8	• The site contains very little surface water during all or most of the fall-winter-spring period
• Water depths during most of the fall-winter-spring period are shallow (<24 inches)	0.5	• If forested, water depths during the fall-winter-spring period are always shallower than 24"
• A large portion of the site is inundated only seasonally	0.4	• Of the water that is present, nearly all is present year-round
• The acreage of various depth categories is about equal during peak annual inundation	0.5	• A single water depth category predominates
• Microtopographic variation is extensive	0.3	• The substrate is flat, prohibiting puddle formation
• None of the site is visited frequently by humans on foot during September-Apr	0.4	• All of the site is visited frequently by humans on foot during September-April
• A large variety of herbs is present	0.5	• Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species
• Site is actively managed to control the spread of non-native or invasive species		
• Water quality is excellent	0.4	• Water is heavily contaminated with pollutants

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.5	• Substrates have recently been recontoured, compacted, excavated, plowed, disked or leveled,
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water	0.5	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• Surrounding landscape contains large acreage of hydric soil, wetlands, and water, including some with a different water regime	0.5	• Surrounding landscape contains no wetlands, ponds, or hydric soil
Function Capacity Score:		0.5
<i>Songbird Habitat Support</i>		
• Some part of the site contains surface water during all of the year	0.8	• Surface water is never present at any time of the year
• The site contains a large acreage of closed-canopy forest, native shrubland, wet prairie, and/or emergent wetland	0.6	• Acreage of these is very small
• If the site is mostly native shrubland and/or forest then large-diameter trees, snags, and undercanopy shrub cover are extensive, and a large variety of trees, shrubs, and vines is present	N/A	• If the site is mostly shrubland and/or forest, then trees are small, snags are absent, under-canopy shrub cover is lacking, and the variety of trees, shrubs, and vines is small and comprised of non-native species
• If the site is mostly wet prairie and/or emergent wetland, then a large variety of herbs is present, the site is actively managed to control the spread of non-native or invasive herb species, and trees and shrubs are concentrated in one part of the site	0.4	• If the site is mostly prairie and/or emergent wetland, then the variety of herbs is small, the site is not actively managed, and trees and shrubs are scattered widely throughout the site
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water	0.5	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• None of the site is visited frequently by humans on foot in April through June	0.4	• Every part of the site is visited frequently by humans on foot in April through June
• Busy roads are distant from the site	0.5	• Busy roads adjoin the site
Function Capacity Score:		0.5 wrens observed
<i>Support of Characteristic Vegetation</i>		
• Trees, shrubs, and herbs are all present, and are well-interspersed throughout the site	0.3	• Only one plant form is present
• If trees are present, many are very old and large, with abundant evidence of regeneration	N/A	• If trees are present, all are young
• If shrubs are present, all of the significantly present shrub species are natives	N/A	• If shrubs are present, they are comprised of just one species, and it is non-native
• If herbs are present, all of the significantly present herb species are natives	0.8	• If herbs are present, they are comprised of just one species, and it is non-native
• Microtopographic relief is great	0.3	• The substrate is flat, prohibiting puddle formation
• Springtime surface water levels drop very slowly (<2 vertical inches per 30 days, average)	0.5	• Springtime water levels fluctuate or drop rapidly (>2 inches per 10 days, average)
• None of the site is visited frequently by humans on foot in September through April	0.4	• Every part of the site is visited frequently by humans on foot in September through April
• Busy roads are distant from the site	0.5	• Busy roads adjoin the site
• Land cover in the contributing watershed is predominantly "natural"	0.6	• Land cover in the contributing watershed largely contains impervious surface, bare ground, lawns, and row crops
• Land cover in surrounding buffer zones is predominantly a mix of natural grassland, native shrubland, woodland, wetlands, and water	0.5	• Land cover in surrounding buffer largely contains impervious surface, bare ground, lawns, and row crops
• Water quality is excellent	0.4	• Water is heavily contaminated with pollutants
Function Capacity Score:		0.5



## ASSESSMENT OF FUNCTION CAPACITY: JUDGMENTAL METHOD

Date: 2/26/2008 Project/Site: Eccles Segment (Caliente Alternative) - Clover Creek floodplain wetlands

Plot #: AV-6 Investigators: NBH, MPW HGM Classification: Riverine Flow-through

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Water Storage and Delay</b>		
<ul style="list-style-type: none"> <li>Proportion of site inundated seasonally is large</li> <li>Flood marks, stunted plants, and/or distinctive assemblages of plant species</li> </ul>	0.2	<ul style="list-style-type: none"> <li>None of site is inundated only seasonally</li> <li>Site always comprised of permanent water or high water table</li> </ul>
<ul style="list-style-type: none"> <li>Most of surface water in the seasonally inundated zone remains for a few days after each rain event, not less or more</li> </ul>	0.1	<ul style="list-style-type: none"> <li>Water added from rain events empties quickly from all of the site, via outlets or percolation</li> </ul>
Function Capacity Score:	0.2	
<b>Sediment Stabilization and Phosphorus Retention</b>		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> </ul>
<ul style="list-style-type: none"> <li>Texture of substrate in the upper 12" of seasonal zone is clay, silty clay, sandy clay, clay loam, or native organic</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Upper 12" of substrate in seasonal zone is mostly sand or gravel</li> </ul>
<ul style="list-style-type: none"> <li>Herbs, shrubs, and/or vines together always occupy a large percent of ground cover in seasonal zone</li> </ul>	0.3	<ul style="list-style-type: none"> <li>All or nearly all of substrate in seasonal zone is unvegetated</li> </ul>
<ul style="list-style-type: none"> <li>Shallow pools and puddles are present and well interspersed with herbaceous vegetation</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Shallow pools are absent at all times of the year</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>Extensive evidence of scour</li> </ul>
<ul style="list-style-type: none"> <li>Most of the site has complex microtopography</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Substrate is uniformly flat, no microtopography</li> </ul>
Function Capacity Score:	0.3	
<b>Nitrogen Removal</b> (only proceed at moieties or features indicating oxygen deficits in soils in part of the site)		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> </ul>
<ul style="list-style-type: none"> <li>Some surface water or saturation remains year-round</li> <li>Surface water dispersed around the site so water flow paths and residence times are long</li> </ul>	0.1	<ul style="list-style-type: none"> <li>No surface water or saturation remains year-round</li> <li>If seasonal flooding occurs, surface water is concentrated in one part of site (channel, pond) and doesn't remain for long</li> </ul>
<ul style="list-style-type: none"> <li>Soil microbial processes are mature, suggested by dead wood, thick organic layer, many large-diameter trees</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Soil microbial processes not well developed, suggested by lack of dead wood, thick organic layer, many large-diameter trees</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>None of site constructed from upland</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> </ul>
<ul style="list-style-type: none"> <li>Most of the site has complex microtopography</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Most of the site has no noticeable microtopography</li> </ul>
<ul style="list-style-type: none"> <li>Site is burned annually or biennially</li> </ul>	0	<ul style="list-style-type: none"> <li>Site has not been burned in recent years</li> </ul>
Function Capacity Score:	0.2	
<b>Primary Production</b>		
<ul style="list-style-type: none"> <li>All of site has vascular plants and/or water with algae</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Much of site is devoid of vascular plants and/or algae</li> </ul>
<ul style="list-style-type: none"> <li>A variety of plant forms is present in about equal proportions and is well-distributed</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Whatever plants are present are mainly of a single form</li> </ul>
<ul style="list-style-type: none"> <li>Some shallow (&lt;3 ft) surface water remains year-round, and in summer is dispersed around the site</li> </ul>	0.1	<ul style="list-style-type: none"> <li>The site is entirely dry during much of the year</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> </ul>
<ul style="list-style-type: none"> <li>Site's contributing watershed contains no cropland, paved surface, buildings, or lawns</li> </ul>	0.8	<ul style="list-style-type: none"> <li>The site's contributing watershed is almost entirely cropland, paved surface, buildings, and lawns</li> </ul>
Function Capacity Score:	0.4	
<b>Thermoregulation</b> (only assess at riverine sites where part of the site is permanently inundated & connected to other water body)		
<ul style="list-style-type: none"> <li>Entire water surface in summer is shaded by closed tree canopy or topography</li> </ul>	0.2	<ul style="list-style-type: none"> <li>None of water is shaded by vegetation or topography</li> <li>All of water is shallower than 2 m during summer</li> </ul>
<ul style="list-style-type: none"> <li>Almost the entire site consists of water deeper than 6 ft</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Very little of the site contains permanent water</li> <li>Water is never deeper than a few inches</li> </ul>
Function Capacity Score:	0.3	

Fish observed in stagnant ponds associated w/ seasonal wash channel.

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Resident Fish Habitat Support</b> (only assess if part of the site is permanently inundated and subclass is RI)		
<ul style="list-style-type: none"> <li>Permanent water is extensive</li> <li>Site is connected only briefly with channels</li> <li>Non-native fish species are absent <i>no fish data</i></li> </ul>	0.2	<ul style="list-style-type: none"> <li>Permanent water is very limited</li> <li>Non-native species dominate the resident fish component, although some natives are present</li> </ul>
<ul style="list-style-type: none"> <li>Shallow water area and proportion of site that is inundated only seasonally is large enough to support spawning</li> <li>Supports high densities of aquatic invertebrates</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Shorelines are steep, dropping sharply into water deeper than 6 ft</li> <li>Little or no seasonal zone is present</li> </ul>
<ul style="list-style-type: none"> <li>Cover providing year-round shelter from predators is abundant</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> </ul>	0.5 0.6	<ul style="list-style-type: none"> <li>Cover is scarce or lacking where water is present seasonally</li> <li>Water is heavily contaminated, oxygen deficits</li> </ul>
<b>Function Capacity Score:</b>		0.5
<b>Anadromous Fish Habitat Support</b> (only assess if part of site is accessible to anadromous fish during seasonal inundation)		
<ul style="list-style-type: none"> <li>Floodwaters spill into site across a broad bank or wide, unobstructed mouth</li> <li>Floodwaters remain for more than a few days</li> <li>Non-native fish species are generally absent</li> <li>Substrates suitable for spawning or feeding are extensively present</li> <li>Cover that provides shelter from currents and predators is abundant, at least in seasonal zone</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> <li>Summertime temperature maxima do not exceed preferred range of anadromous fish</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Floodwaters enter most of the site entirely through a narrow channel, ditch, or pipe</li> <li>No surface water remains for more than a few days</li> <li>Non-native fish species predominate</li> <li>Substrates suitable for spawning or feeding are scarce or absent</li> <li>Cover that provides shelter from currents and predators is scarce or lacking from all parts of site</li> <li>Water is heavily contaminated, oxygen deficits</li> <li>Summertime temperature maxima exceed limits lethal to anadromous fish</li> </ul>
<b>Function Capacity Score:</b>		↓
<b>Invertebrate Habitat Support</b>		
<ul style="list-style-type: none"> <li>Surface water is permanent or nearly permanent</li> <li>All of water is shallower than 2 ft during May-Sept</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Surface water is present only briefly (RI sites) or not at all (SF sites), OR</li> <li>Nearly all water remains deeper than 6 ft during May-Sept</li> </ul>
<ul style="list-style-type: none"> <li>Cover that supports algae and provides shelter from currents and predators is abundant in both seasonal and permanent zone</li> <li>Plant forms and species are highly diverse</li> </ul>	0.2 0.5	<ul style="list-style-type: none"> <li>Cover that supports algae and provides shelter from currents and predators is lacking</li> <li>Only one plant form is present, and species richness is low</li> </ul>
<ul style="list-style-type: none"> <li>Vegetation is well-interspersed with pools</li> <li>Water quality (esp. dissolved oxygen) is excellent</li> </ul>	0.4 0.6	<ul style="list-style-type: none"> <li>Vegetation and pools are in 2 separate areas</li> <li>Water is heavily contaminated, oxygen deficits</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR</li> <li>Site was entirely constructed from upland</li> </ul>
<ul style="list-style-type: none"> <li>Surrounding landscape contains large acreage of wetlands, including some with different water regime than site</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Surrounding landscape contains no wetlands or ponds</li> </ul>
<b>Function Capacity Score:</b>		0.4
<b>Amphibian and Turtle Habitat</b>		
<ul style="list-style-type: none"> <li>Permanent water is absent, but shallow surface water with partly-submerged fine-stemmed herbs is extensive, and recedes very gradually during Jan-May (at least 30 days when water levels fluctuate &lt;2 inches), OR</li> <li>Permanent water is extensive and contains abundant underwater cover and partly-submerged fine-stemmed herbs</li> </ul>	0.2	<ul style="list-style-type: none"> <li>Site never contains surface water, OR</li> <li>Site is entirely surface water, which either never fluctuates vertically (no seasonal zone present), or fluctuates too much (&gt;2 inches during all 10-day periods), or is devoid of any emergent herbs that are partly-submerged during springtime, or flows faster than 4"/sec during the entire spring, everywhere, or is mostly deeper than 40" and is bordered by shoreline with very steep slope</li> </ul>
<ul style="list-style-type: none"> <li>Bullfrogs and other non-native predators are absent</li> </ul>	?	<ul style="list-style-type: none"> <li>Bullfrogs and other non-native predators are abundant</li> </ul>
<ul style="list-style-type: none"> <li>If surface water everywhere in the site is flowing during springtime, there are at least 30 days when current velocities are &lt;4"/sec</li> </ul>	0.3	<ul style="list-style-type: none"> <li>If surface water everywhere in the site is flowing during springtime, there are never more than 30 days when current velocities are &lt;4"/sec</li> </ul>
<ul style="list-style-type: none"> <li>Extensive and varied woody debris in seasonal zone</li> </ul>	0.4	<ul style="list-style-type: none"> <li>No woody debris in seasonal zone</li> </ul>
<ul style="list-style-type: none"> <li>Either vegetation and pools are well-interspersed during high water level, or woody vegetation bordering the larger pools is located mostly on the north end</li> <li>Microtopography is quite varied</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Vegetation and pools are in separate areas of the site during high water level, and any woody vegetation bordering the larger pools is located mostly on their south end.</li> <li>Microtopography is too flat to form puddles</li> </ul>

Overall, wetland is RFT but contains impounded pocket



HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
• Suitable basking sites for turtles and calling sites for frogs are present	0.4	• There are no basking sites for turtles or calling sites for frogs
• Land cover in adjoining uplands is a mix of natural grassland and woodland w/ extensive woody debris	0.8	• Land cover in adjoining uplands contains impervious surface, bare ground, lawns, and row crops
• Shorelines are gently sloping	0.5	• Shorelines are mostly steep
• Busy roads are distant from the site	0.8	• Busy roads adjoin the site
• Many other wetlands are present nearby	0.2	• There are no other wetlands nearby
• Water quality is excellent	0.6	• Water is heavily contaminated, oxygen deficits
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.3	• Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR
• No evidence of severe erosion		• Site was entirely constructed from upland
• Soils and submerged sediments contain a moderately thick organic layer (leaf litter, peat, decomposed organics, etc.)	0.4	• Soils and submerged sediments contain no organic layer, and are mostly hard-packed clay, OR
		• Organic layer is so thick that water is chronically anoxic
Function Capacity Score:		0.4
<b>Breeding Waterbird Support</b>		
• The site contains many acres of (nearly) permanent surface water, or a large permanent wetland is located nearby, AND	0.2	• Surface water is present for only a few weeks during Apr-June, OR
• Water depths are shallow (2-24 inches) in Apr-Aug		• Nearly all water remains deeper than 6 ft during May-Sept, AND
• Most of the shoreline is not steep	0.6	• No permanent wetlands are located nearby
• Larger pools of water are bordered by wide, dense band of tall herbs/shrubs during Apr-Aug	0.2	• Most of the shoreline is steep
• About equal proportions of water and vegetation are present, and are well-interspersed during Apr-Aug	0.2	• Larger pools are bordered by only a narrow band of sparse vegetation
• Water levels do not abruptly rise a foot or more during Apr-June	0.1	• Vegetation and pools are in 2 separate areas or zones, not interspersed
• A large variety of herbs is present	0.3	• Water levels are prone to quickly rise at least 1 foot during Apr-June
• Site is actively managed to control spread of non-native or invasive species		• Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, and water	0.8	many salt cedars - invasive spp.
• Busy roads are distant from the site	0.8	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• Water quality is excellent	0.6	• Busy roads border the site
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.3	• Water is heavily contaminated with pollutants
• Surrounding landscape contains large acreage of wetlands, including some with different water regime than site	0.2	• Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled,
• Nest boxes, nest platforms, and other artificial structures are extensive and regularly maintained	0.	• Surrounding landscape contains no wetlands or ponds
• None of the site is visited frequently by humans on foot in April-June	0.8	• No nest boxes, nest platforms, or other artificial structures are present, or aren't well-maintained
		• All of the site is visited frequently by humans on foot during April-June
Function Capacity Score:		0.4
<b>Wintering and Migratory Waterbird Support</b>		
• The site contains extensive surface water during all or most of the fall-winter-spring period	0.2	• The site contains very little surface water during all or most of the fall-winter-spring period
• Water depths during most of the fall-winter-spring period are shallow (<24 inches) (if present)	0.6	• If forested, water depths during the fall-winter-spring period are always shallower than 24"
• A large portion of the site is inundated only seasonally	0.8	• Of the water that is present, nearly all is present year-round
• The acreage of various depth categories is about equal during peak annual inundation	0.4	• A single water depth category predominates
• Microtopographic variation is extensive	0.4	• The substrate is flat, prohibiting puddle formation
• None of the site is visited frequently by humans on foot during September-Apr	0.8	• All of the site is visited frequently by humans on foot during September-April
• A large variety of herbs is present	0.5	• Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species
• Site is actively managed to control the spread of non-native or invasive species		
• Water quality is excellent	0.6	• Water is heavily contaminated with pollutants

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.3	• Substrates have recently been recontoured, compacted, excavated, plowed, disked or leveled,
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water	0.8	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• Surrounding landscape contains large acreage of hydric soil, wetlands, and water, including some with a different water regime	0.2	• Surrounding landscape contains no wetlands, ponds, or hydric soil
<b>Function Capacity Score:</b>	0.5	
<b><i>Songbird Habitat Support</i></b>		
• Some part of the site contains surface water during all of the year	0.2	• Surface water is never present at any time of the year
• The site contains a large acreage of closed-canopy forest, native shrubland, wet prairie, and/or emergent wetland	0.5	• Acreage of these is very small
• If the site is mostly native shrubland and/or forest then large-diameter trees, snags, and undercanopy shrub cover are extensive, and a large variety of trees, shrubs, and vines is present	0.5	• If the site is mostly shrubland and/or forest, then trees are small, snags are absent, under-canopy shrub cover is lacking, and the variety of trees, shrubs, and vines is small and comprised of non-native species
• If the site is mostly wet prairie and/or emergent wetland, then a large variety of herbs is present, the site is actively managed to control the spread of non-native or invasive herb species, and trees and shrubs are concentrated in one part of the site	N/A	• If the site is mostly prairie and/or emergent wetland, then the variety of herbs is small, the site is not actively managed, and trees and shrubs are scattered widely throughout the site
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water	0.8	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• None of the site is visited frequently by humans on foot in April through June	0.8	• Every part of the site is visited frequently by humans on foot in April through June
• Busy roads are distant from the site	0.8	• Busy roads adjoin the site
<b>Function Capacity Score:</b>	0.6	<i>Principal function</i>
<b><i>Support of Characteristic Vegetation</i></b>		
• Trees, shrubs, and herbs are all present, and are well-interspersed throughout the site	0.6	• Only one plant form is present
• If trees are present, many are very old and large, with abundant evidence of regeneration	0.7	• If trees are present, all are young
• If shrubs are present, all of the significantly present shrub species are natives	0.5	• If shrubs are present, they are comprised of just one species, and it is non-native
• If herbs are present, all of the significantly present herb species are natives	0.6	• If herbs are present, they are comprised of just one species, and it is non-native
• Microtopographic relief is great	0.4	• The substrate is flat, prohibiting puddle formation
• Springtime surface water levels drop very slowly (<2 vertical inches per 30 days, average)	0.1	• Springtime water levels fluctuate or drop rapidly (>2 inches per 10 days, average)
• None of the site is visited frequently by humans on foot in September through April	0.8	• Every part of the site is visited frequently by humans on foot in September through April
• Busy roads are distant from the site	0.8	• Busy roads adjoin the site
• Land cover in the contributing watershed is predominantly "natural"	0.8	• Land cover in the contributing watershed largely contains impervious surface, bare ground, lawns, and row crops
• Land cover in surrounding buffer zones is predominantly a mix of natural grassland, native shrubland, woodland, wetlands, and water	0.8	• Land cover in surrounding buffer largely contains impervious surface, bare ground, lawns, and row crops
• Water quality is excellent	0.6	• Water is heavily contaminated with pollutants
<b>Function Capacity Score:</b>	0.6	

## ASSESSMENT OF FUNCTION CAPACITY: JUDGMENTAL METHOD

Date: 2/26/2008 Project/Site: Mina Corridor - Shurz Bypass - Walker River Crossing

Plot #: AU-7 Investigators: NBH, MPW

HGM Classification: RT

Wetlands WRN-1 and WRN-4

REMOTE ASSESSMENT\*

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Water Storage and Delay</b>		
<ul style="list-style-type: none"> <li>Proportion of site inundated seasonally is large</li> <li>Flood marks, stunted plants, and/or distinctive assemblages of plant species</li> </ul>	0.4	<ul style="list-style-type: none"> <li>None of site is inundated only seasonally</li> <li>Site always comprised of permanent water or high water table</li> </ul>
<ul style="list-style-type: none"> <li>Most of surface water in the seasonally inundated zone remains for a few days after each rain event, not less or more</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Water added from rain events empties quickly from all of the site, via outlets or percolation</li> </ul>
<b>Function Capacity Score: 0.4</b>		
<b>Sediment Stabilization and Phosphorus Retention</b>		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> <li>Texture of substrate in the upper 12" of seasonal zone is clay, silty clay, sandy clay, clay loam, or native organic</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> <li>Upper 12" of substrate in seasonal zone is mostly sand or gravel</li> </ul>
<ul style="list-style-type: none"> <li>Herbs, shrubs, and/or vines together always occupy a large percent of ground cover in seasonal zone</li> </ul>	0.2	<ul style="list-style-type: none"> <li>assumed river alluvium - coarse sandy entisols</li> </ul>
<ul style="list-style-type: none"> <li>Shallow pools and puddles are present and well interspersed with herbaceous vegetation</li> </ul>	0.7	<ul style="list-style-type: none"> <li>All or nearly all of substrate in seasonal zone is unvegetated</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Shallow pools are absent at all times of the year</li> </ul>
<ul style="list-style-type: none"> <li>Most of the site has complex microtopography</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> </ul>
<b>Function Capacity Score: 0.5</b>		
<b>Nitrogen Removal</b> (only assessed at riverine sites where a part of the site is permanently inundated & connected to other water body)		
<ul style="list-style-type: none"> <li>High score was assigned to Water Storage &amp; Delay</li> <li>Some surface water or saturation remains year-round</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Low score was assigned to Water Storage &amp; Delay</li> <li>No surface water or saturation remains year-round</li> </ul>
<ul style="list-style-type: none"> <li>Surface water dispersed around the site so water flow paths and residence times are long</li> </ul>	0.2	<ul style="list-style-type: none"> <li>If seasonal flooding occurs, surface water is concentrated in one part of site (channel, pond) and doesn't remain for long</li> </ul>
<ul style="list-style-type: none"> <li>Soil microbial processes are mature, suggested by dead wood, thick organic layer, many large-diameter trees</li> </ul>	0.3	<ul style="list-style-type: none"> <li>Soil microbial processes not well developed, suggested by lack of dead wood, thick organic layer, many large-diameter trees</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> <li>None of site constructed from upland</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> </ul>
<ul style="list-style-type: none"> <li>Most of the site has complex microtopography</li> </ul>	0.4	<ul style="list-style-type: none"> <li>Most of the site has no noticeable microtopography</li> </ul>
<ul style="list-style-type: none"> <li>Site is burned annually or biennially</li> </ul>	0	<ul style="list-style-type: none"> <li>Site has not been burned in recent years</li> </ul>
<b>Function Capacity Score: 0.3</b>		
<b>Primary Production</b>		
<ul style="list-style-type: none"> <li>All of site has vascular plants and/or water with algae</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Much of site is devoid of vascular plants and/or algae</li> </ul>
<ul style="list-style-type: none"> <li>A variety of plant forms is present in about equal proportions and is well-distributed</li> </ul>	0.7	<ul style="list-style-type: none"> <li>Whatever plants are present are mainly of a single form</li> </ul>
<ul style="list-style-type: none"> <li>Some shallow (&lt;3 ft) surface water remains year-round, and in summer is dispersed around the site</li> </ul>	0.1	<ul style="list-style-type: none"> <li>The site is entirely dry during much of the year</li> </ul>
<ul style="list-style-type: none"> <li>Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled</li> <li>No evidence of severe erosion</li> </ul>	0.5	<ul style="list-style-type: none"> <li>Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled</li> </ul>
<ul style="list-style-type: none"> <li>Site's contributing watershed contains no cropland, paved surface, buildings, or lawns</li> </ul>	0.6	<ul style="list-style-type: none"> <li>The site's contributing watershed is almost entirely cropland, paved surface, buildings, and lawns</li> </ul>
<b>Function Capacity Score: 0.5</b>		
<b>Thermoregulation</b> (only assess at riverine sites where a part of the site is permanently inundated & connected to other water body)		
<ul style="list-style-type: none"> <li>Entire water surface in summer is shaded by closed tree canopy or topography</li> </ul>	0.5	<ul style="list-style-type: none"> <li>None of water is shaded by vegetation or topography</li> </ul>
<ul style="list-style-type: none"> <li>Almost the entire site consists of water deeper than 6 ft</li> </ul>	0.2	<ul style="list-style-type: none"> <li>All of water is shallower than 2 m during summer</li> </ul>
<b>Function Capacity Score: 0.4</b>		

\* This assessment unit was not visited by NBH or MPW. Assessment scores based on wetland descriptions & mapping documented in the "Waters of the U.S. Jurisdictional Determination Report for Yucca Mountain Project, Mina Rail Corridor (PBS&J, 2007)



HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
<b>Resident Fish Habitat Support</b> (only assess if part of the site is permanently inundated and subclass is R1)		
• Permanent water is extensive	0.2	• Permanent water is very limited
• Site is connected only briefly with channels	0.3	• Non-native species dominate the resident fish component, although some natives are present
• Non-native fish species are absent	0.5	• Shorelines are steep, dropping sharply into water deeper than 6 ft
• Shallow water area and proportion of site that is inundated only seasonally is large enough to support spawning <i>assumed off-channel habitat during high flows</i>	0.5	• Little or no seasonal zone is present
• Supports high densities of aquatic invertebrates	0.5	• Cover is scarce or lacking where water is present seasonally
• Cover providing year-round shelter from predators is abundant	0.5	• Water is heavily contaminated, oxygen deficits
• Water quality (esp. dissolved oxygen) is excellent	0.4	
<b>Function Capacity Score:</b>		
<b>Anadromous Fish Habitat Support</b> (only assess if part of site is accessible to anadromous fish during seasonal inundation)		
• Floodwaters spill into site across a broad bank or wide, unobstructed mouth	?	• Floodwaters enter most of the site entirely through a narrow channel, ditch, or pipe
• Floodwaters remain for more than a few days	?	• No surface water remains for more than a few days
• Non-native fish species are generally absent	?	• Non-native fish species predominate
• Substrates suitable for spawning or feeding are extensively present	?	• Substrates suitable for spawning or feeding are scarce or absent
• Cover that provides shelter from currents and predators is abundant, at least in seasonal zone	?	• Cover that provides shelter from currents and predators is scarce or lacking from all parts of site
• Water quality (esp. dissolved oxygen) is excellent	?	• Water is heavily contaminated, oxygen deficits
• Summertime temperature maxima do not exceed preferred range of anadromous fish	?	• Summertime temperature maxima exceed limits lethal to anadromous fish
<b>Function Capacity Score:</b>		
<b>Invertebrate Habitat Support</b>		
• Surface water is permanent or nearly permanent	0.2	• Surface water is present only briefly (R1 sites) or not at all (SF sites), OR
• All of water is shallower than 2 ft during May-Sept	0.6	• Nearly all water remains deeper than 6 ft during May-Sept
• Cover that supports algae and provides shelter from currents and predators is abundant in both seasonal and permanent zone	0.7	• Cover that supports algae and provides shelter from currents and predators is lacking
• Plant forms and species are highly diverse	0.7	• Only one plant form is present, and species richness is low
• Vegetation is well-interspersed with pools	0.7	• Vegetation and pools are in 2 separate areas
• Water quality (esp. dissolved oxygen) is excellent	0.6	• Water is heavily contaminated, oxygen deficits
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.5	• Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR
• No evidence of severe erosion	0.2	• Site was entirely constructed from upland
• Surrounding landscape contains large acreage of wetlands, including some with different water regime than site	0.5	• Surrounding landscape contains no wetlands or ponds
<b>Function Capacity Score:</b>		
<b>Amphibian and Turtle Habitat</b>		
• Permanent water is absent, but shallow surface water with partly-submerged fine-stemmed herbs is extensive, and recedes very gradually during Jan-May (at least 30 days when water levels fluctuate <2 inches), OR	0.2	• Site never contains surface water, OR
• Permanent water is extensive and contains abundant underwater cover and partly-submerged fine-stemmed herbs	?	• Site is entirely surface water, which either never fluctuates vertically (no seasonal zone present), or fluctuates too much (>2 inches during all 10-day periods), or is devoid of any emergent herbs that are partly-submerged during springtime, or flows faster than 4"/sec during the entire spring, everywhere, or is mostly deeper than 40" and is bordered by shoreline with very steep slope
• Bullfrogs and other non-native predators are absent	0.2	• Bullfrogs and other non-native predators are abundant
• If surface water everywhere in the site is flowing during springtime, there are at least 30 days when current velocities are <4"/sec	0.7	• If surface water everywhere in the site is flowing during springtime, there are never more than 30 days when current velocities are <4"/sec
• Extensive and varied woody debris in seasonal zone	0.7	• No woody debris in seasonal zone
• Either vegetation and pools are well-interspersed during high water level, or woody vegetation bordering the larger pools is located mostly on the north end	0.7	• Vegetation and pools are in separate areas of the site during high water level, and any woody vegetation bordering the larger pools is located mostly on their south end
• Microtopography is quite varied		• Microtopography is too flat to form puddles



HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
• Suitable basking sites for turtles and calling sites for frogs are present	0.4	• There are no basking sites for turtles or calling sites for frogs
• Land cover in adjoining uplands is a mix of natural grassland and woodland w/ extensive woody debris	0.8	• Land cover in adjoining uplands contains impervious surface, bare ground, lawns, and row crops
• Shorelines are gently sloping	0.5	• Shorelines are mostly steep
• Busy roads are distant from the site 7.3 miles	0.8	• Busy roads adjoin the site
• Many other wetlands are present nearby	0.2	• There are no other wetlands nearby
• Water quality is excellent	0.6	• Water is heavily contaminated, oxygen deficits
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.5	• Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled, OR
• No evidence of severe erosion		• Site was entirely constructed from upland
• Soils and submerged sediments contain a moderately thick organic layer (leaf litter, peat, decomposed organics, etc.) assumed based on depositional system	0.5	• Soils and submerged sediments contain no organic layer, and are mostly hard-packed clay, OR
• Organic layer is so thick that water is chronically anoxic		
Function Capacity Score:	0.5	
<b>Breeding Waterbird Support</b>		
• The site contains many acres of (nearly) permanent surface water, or a large permanent wetland is located nearby, AND	0.2	• Surface water is present for only a few weeks during Apr-June, OR
• Water depths are shallow (2-24 inches) in Apr-Aug		• Nearly all water remains deeper than 6 ft during May-Sept, AND
• No permanent wetlands are located nearby		
• Most of the shoreline is not steep	0.5	• Most of the shoreline is steep
• Larger pools of water are bordered by wide, dense band of tall herbs/shrubs during Apr-Aug	0.7	• Larger pools are bordered by only a narrow band of sparse vegetation
• About equal proportions of water and vegetation are present, and are well-interspersed during Apr-Aug	0.2	• Vegetation and pools are in 2 separate areas or zones, not interspersed
• Water levels do not abruptly rise a foot or more during Apr-June	0.3	• Water levels are prone to quickly rise at least 1 foot during Apr-June
• A large variety of herbs is present		• Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species
• Site is actively managed to control spread of non-native or invasive species	0.3	
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, and water	0.8	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• Busy roads are distant from the site	0.8	• Busy roads border the site
• Water quality is excellent	0.6	• Water is heavily contaminated with pollutants
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.5	• Substrates throughout the entire site have recently been recontoured, compacted, excavated, plowed, disked or leveled
• Surrounding landscape contains large acreage of wetlands, including some with different water regime than site	0.2	• Surrounding landscape contains no wetlands or ponds
• Nest boxes, nest platforms, and other artificial structures are extensive and regularly maintained	0	• No nest boxes, nest platforms, or other artificial structures are present, or aren't well-maintained
• None of the site is visited frequently by humans on foot in April-June assumed minor presence	0.6	• All of the site is visited frequently by humans on foot during April-June
Function Capacity Score:	0.4	
<b>Wintering and Migratory Waterbird Support</b>		
• The site contains extensive surface water during all or most of the fall-winter-spring period	0.4	• The site contains very little surface water during all or most of the fall-winter-spring period
• Water depths during most of the fall-winter-spring period are shallow (<24 inches) if present	0.5	• If forested, water depths during the fall-winter-spring period are always shallower than 24"
• A large portion of the site is inundated only seasonally (or biennially)	0.7	• Of the water that is present, nearly all is present year-round
• The acreage of various depth categories is about equal during peak annual inundation	0.2	• A single water depth category predominates
• Microtopographic variation is extensive	0.7	• The substrate is flat, prohibiting puddle formation
• None of the site is visited frequently by humans on foot during September-Apr	0.6	• All of the site is visited frequently by humans on foot during September-April
• A large variety of herbs is present		• Vegetation cover is mostly comprised of one or a few non-native or highly invasive native species
• Site is actively managed to control the spread of non-native or invasive species	0.3	
• Water quality is excellent	0.6	• Water is heavily contaminated with pollutants

HIGHEST FUNCTIONING (1.0)	SCORE	MINIMAL FUNCTIONING (0.0)
• Substrates have never been recontoured, compacted, excavated, plowed, disked or leveled	0.5	• Substrates have recently been recontoured, compacted, excavated, plowed, disked or leveled,
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water	0.8	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• Surrounding landscape contains large acreage of hydric soil, wetlands, and water, including some with a different water regime	0.2	• Surrounding landscape contains no wetlands, ponds, or hydric soil
Function Capacity Score:		0.5 Only when W. River floods the wetland
<b>Songbird Habitat Support</b>		
• Some part of the site contains surface water during all of the year	0.2	• Surface water is never present at any time of the year
• The site contains a large acreage of closed-canopy forest, native shrubland, wet prairie, and/or emergent wetland	0.7	• Acreage of these is very small
• If the site is mostly native shrubland and/or forest then large-diameter trees, snags, and undercanopy shrub cover are extensive, and a large variety of trees, shrubs, and vines is present <i>partial assumption - no spp. list</i>	0.6	• If the site is mostly shrubland and/or forest, then trees are small, snags are absent, under-canopy shrub cover is lacking, and the variety of trees, shrubs, and vines is small and comprised of non-native species
• If the site is mostly wet prairie and/or emergent wetland, then a large variety of herbs is present, the site is actively managed to control the spread of non-native or invasive herb species, and trees and shrubs are concentrated in one part of the site	N/A	• If the site is mostly prairie and/or emergent wetland, then the variety of herbs is small, the site is not actively managed, and trees and shrubs are scattered widely throughout the site
• Land cover in surrounding buffer zones is mainly a mix of natural grassland, woodland, agricultural lands, and water	0.8	• Land cover in surrounding buffer zones largely contains impervious surface, bare ground, lawns, and row crops
• None of the site is visited frequently by humans on foot in April through June	0.8	• Every part of the site is visited frequently by humans on foot in April through June
• Busy roads are distant from the site	0.6	• Busy roads adjoin the site
Function Capacity Score:		0.6
<b>Support of Characteristic Vegetation</b>		
• Trees, shrubs, and herbs are all present, and are well-interspersed throughout the site	0.7	• Only one plant form is present
• If trees are present, many are very old and large, with abundant evidence of regeneration	N/A	• If trees are present, all are young
• If shrubs are present, all of the significantly present shrub species are natives	0.5	• If shrubs are present, they are comprised of just one species, and it is non-native <i>1/2 &amp; 1/2 dominance</i>
• If herbs are present, all of the significantly present herb species are natives	?	• If herbs are present, they are comprised of just one species, and it is non-native
• Microtopographic relief is great	0.7	• The substrate is flat, prohibiting puddle formation
• Springtime surface water levels drop very slowly (<2 vertical inches per 30 days, average)	0.2	• Springtime water levels fluctuate or drop rapidly (>2 inches per 10 days, average)
• None of the site is visited frequently by humans on foot in September through April	0.6	• Every part of the site is visited frequently by humans on foot in September through April
• Busy roads are distant from the site	0.8	• Busy roads adjoin the site
• Land cover in the contributing watershed is predominantly "natural"	0.8	• Land cover in the contributing watershed largely contains impervious surface, bare ground, lawns, and row crops
• Land cover in surrounding buffer zones is predominantly a mix of natural grassland, native shrubland, woodland, wetlands, and water	0.8	• Land cover in surrounding buffer largely contains impervious surface, bare ground, lawns, and row crops
• Water quality is excellent	0.6	• Water is heavily contaminated with pollutants
Function Capacity Score:		0.6

**APPENDIX B:**

**REPRESENTATIVE PHOTOGRAPHS OF WETLAND  
FUNCTION ASSESSMENT UNITS**





## APPENDIX B: TYPICAL PHOTOS OF WETLAND ASSESSMENT UNITS

Project:

**RAIL ALIGNMENT FOR YUCCA MOUNTAIN –  
WETLANDS FUNCTION ASSESSMENT**

URS Project No.

39400113

Photo No.

**1**

Date:

February 13, 2008

**Direction Photo Taken:**

North/Northeast (upstream)  
along lower Meadow Valley  
Wash, in northern area of  
Caliente, Nevada.

**Description:**

Depicts WT-5 (lower Meadow  
Valley Wash) in the southern  
portion of the Caliente  
Alternative alignment.

Typical Wetland Function  
Assessment Unit AU-1, showing  
incised banks, areas of erosion,  
and dense shrub and  
herbaceous vegetation in  
channel. Scattered trees are  
visible in the background, to the  
north. Hwy. 93 is to left.



Photo No.

**2**

Date:

February 12, 2008

**Direction Photo Taken:**


East/Northeast across Indian  
Cove Staging Yard Option  
pasture area from old railroad  
berm.

**Description:**

Depicts central portion of CC7,  
and is typical of Wetland  
Function Assessment Unit AU-2.  
Grazed pasture with ponding  
likely from groundwater/rainfall  
in this season, not irrigation.  
Pasture is relatively flat with  
microtopography and low man-  
made "check-berms" that run  
east-west in two or three places  
along the north-south axis of this  
wetland pasture.





<b>Photo No.</b> <b>3</b>	<b>Date:</b> February 12, 2008	
<b>Direction Photo Taken:</b>  North (upstream) along Meadow Valley Wash in Meadow Valley Pasture.		
<b>Description:</b>  Depicts northeast portion of CC17 with typical Wetland Function Assessment Unit AU-3. Shows floodplain with Riverine Flow-through wetland, fringing bulrush and landscape connectivity between channel and adjacent wetland meadow that typifies AU-3.		

<b>Photo No.</b> <b>4</b>	<b>Date:</b> February 12, 2008
<b>Direction Photo Taken:</b>  North from midway along the east border of CC-9, separated by old railroad berm (photo origin point) from Indian Cove Pasture to the East/right side.	
<b>Description:</b>  Depicts northern portion of CC9, typical of Wetland Function Assessment Unit AU-4. Shows narrow, linear character of AU-4 wetlands, which are typically west of the old railroad berm. This wetland has a narrow, shallow ditch meandering through. Most AU-4 wetlands do not have this feature and appear as narrow strips of grazed wetland pasture.	





<b>Photo No.</b> <b>5</b>	<b>Date:</b> February 12, 2008
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**Direction Photo Taken:**

North/northeast from southwest corner of CC12. Trucks are parked along east side of Hwy. 93 in background.

**Description:**

Depicts western portion of CC12, typical of Wetland Function Assessment Unit AU-5. A mixture of shallow open water and vegetation, in this case pasture/meadow, low growing grasses, characterizes AU-5 wetlands. This wetland appears likely to have been historically excavated in the western portion this was observed to be ponded during the field investigation.



<b>Photo No.</b> <b>6</b>	<b>Date:</b> February 13, 2008
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**Direction Photo Taken:**

North/northwest from near southern boundary of WT-9, midway along its southern edge.

**Description:**

Depicts WT-9 in the Eccles Alternative Segment, typical of Wetland Function Assessment Unit AU-6. This wetland AU lies within the active floodplain of Clover Creek. Tamarisk seedlings ranging from shin- to waist-high are visible against the mostly bare substrate. Deposition of sediment and small woody debris were observed indicating active stream flow through this area.

